

COAL AGE

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No. 11

What Was Wrong?

"Thou hast been faithful over a few things, I will make thee ruler over many things."



THE above is not a text nor is what follows a sermon. This quotation represents what every employee has the right to expect from his employer. Fidelity, diligence, and the consistent performance of assigned duties, are the tokens by which the valuable employee may be recognized. And when the opportunity or necessity arises, when the time comes when the master must delegate greater responsibility to one or another of his servants, he would be foolish indeed did he not select a man of proved ability and zeal. The above quotation therefore represents in concise form the basic principle upon which all promotions should be made, because it voices the successful experience of all mankind in this direction since the world began.

A FEW days ago a man from Pittston, Penn., was retired on a pension after serving one coal-mining company continuously for 61 years. Beginning as a report boy, this man filled various positions about the mine until he was made a pump runner, then finally an engineer, in which capacity he served continuously for 34 years at the same colliery. Thus, after 27 years of service, he attained a comparatively humble position, which he held throughout the balance of his active life.

The record of this man's career, except for his unusual longevity, is by no means exceptional. It differs only in degree from that of hundreds of others in the employ of coal companies throughout the land.

NOW what was wrong? Was this man personally at fault for his inability to rise? Was there something lacking in his individuality or training? Or was the management, the system under which he labored, weak and inefficient?

Thirty-four years at one shaft, manipulating the same levers, hoisting the same loads, guarding against the same dangers, carrying the same responsibilities! Was the man reasonably intelligent? Men cannot hold such a position and lack this quality. Was he

reliable? He spent 34 years at the same job. Was he zealous? Again, he was 34 years at the same job; this certainly requires more zeal than is possessed by the average human. Was he a "booze hoister"? Liquor always gets the best of a man; it never allows him to hold a responsible position for any length of time. Were no higher positions open during his term of service? It is usually considered that 30 years makes up a generation. During the time that this employee was patiently, carefully working the levers of his engine, it is reasonably safe to assume that an entirely new set of men had replaced those officials who from one cause or another had dropped out.

No! This man's stagnation arose from none of these causes. He did his work well and was consequently allowed to continue doing it. A niche having been found which he was capable of satisfactorily filling, he was figuratively, if not literally, built into it. And this workman's career is a replica, differing very little from that of hundreds, possibly thousands, of others engaged in the coal industry.

THIS is an example of one reason why so few native Americans of the present generation take up mining. If a man does his work faithfully and well, when the proper time arrives promotion should be his just due. He has "been faithful over a few things," which is a sure indication of what he should develop into when given charge of many things. The miner's son who begins behind the ribbon counter may some day be called behind the manager's desk. Some coal companies apparently reverse the logical order of things and write over their door the forbidding motto, "Who enters here leaves hope behind."

It would be a poor father indeed who would sanction, much less advise and counsel, his son to enter an industry which although paying fair "wages," yet by methods of stagnation neglects ability, discounts initiative, chokes ambition, and thus murders hope.

Ideas and Suggestions

Operators' Compensation Defense

By H. BROOKS*

The employer in Alberta is finding that it is increasingly expensive to insure against his liability for accidents happening to his employees, and the cost of the insurance is growing steadily because the workmen are rapidly learning just how they can impose on the employer by prolonging the duration of the disability and by taking advantage of interpretations of the liability acts which little accord with the intentions of the legislators who framed them.

Consequently, it seems to me that the operators should combine to insure themselves against such imposition and should be actively represented by counsel in court when cases of this kind arise. But this is not the only cause for a combination. Future cases regarding liability will come before a commission for final decision, and the operators should arrange to have their contentions argued before this tribunal in their corporate interest.

Under present conditions in Alberta all districts are rated alike; but if an association were formed and properly organized, it appears to me that some rating scheme might be adopted which would be acceptable to every company affected, and yet would take into due consideration the greater or lesser liability resulting from the conditions of mining existing in the various districts.

The association thus suggested should be a limited liability company, and the owners of mines who are members of the company should be assessed according to output at a rate determined by the class of mine receiving the protection. Though there would be some argument as to the proper classification of mines and risks, still I believe the scheme could be adopted with little opposition, and certainly the system proposed would be much more satisfactory than that now in use.

Insurance companies are in the business to make money, and an organization of operators such as proposed would be a saving to those thus associated. The lack of direct interest on the part of insured operators often delays settlement. There are many cases which could be settled between employer and employed in a mutually satisfactory way, but left to the lawyers of the opposing parties no satisfactory settlement takes place till after the question has gone into court, thus involving heavy costs.

It may be said that the rigid classification of mines according to the inherent risks of the district or manner of working employed may make some of the members of the organization careless or indifferent as to the number and severity of their accidents. It may be feared that, feeling themselves protected, they would fail to take proper precautions against accident. I regard the legislation in the Mines Acts adequate to meet this difficulty.

Moreover, the mines in any one district will have the same classification and rating. They will be inspected by the same inspector. In consequence the operators in

that district will have a pretty clear idea as to the character of the accident-prevention work in neighboring mines, and they may be relied on to do their part in making operators who are less interested in safety and reduced liability keep their mines up to a high safety standard.

The tonnage figures on which the gross liability payment would be based could be obtained from the Government. As there is a penalty for turning in fraudulent and misleading returns, the reports from this source can be fully relied on. Of course, the inspection charges would be large, but these have now to be paid by the insurance companies; and the present liability payments demanded of the operators are made large enough to amply cover this charge. The mutual company could provide for such inspection service without difficulty and still keep its charges below those of corporations organized solely for profit.

I have noticed that there has been little consideration given to saving in compensation expenditure except where a large amount is involved, as in the case of a fatal accident or the loss of a limb. The matter is worthy of careful consideration no matter how small the payment to be met, and provision should be made before the immediate need for compensation is upon us.

As a further argument for a mutual insurance company it may be added that a company restricting its attention to the insurance of the liability at coal mines would give the interests of the mining industry more careful and expert consideration than would a company dealing in insurance of many different kinds and selling the assurance to companies engaged in every form of industry.

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Upraising an Airshaft

By T. EDWIN SMITH*

A year ago, it became necessary to put in an airshaft in a little coal mine I have in Alberta. The cover was less than 30 ft., composed of soft sandstone and glacial drift. Circumstances made it necessary for me to do the work myself, so I decided to begin at the bottom and work upward.

I started in a crosscut about 6 ft. from the entry and bored holes upward with a breast auger, shooting the rock down with black powder.

The shaft was small, only 2½x4 ft., and with a breast auger nearly 6 ft. long the holes were of necessity nearly vertical. Naturally, I did not get the full benefit of the powder, but by putting in holes a little over 2 ft. deep I could shoot down about 18 in. of rock at a time.

When the strata became so hard that I could not make the breast auger cut by pushing up on it with my arm. I used a pry made from a piece of 2x4 about 4 ft. long. I put one end into a hitch cut in the side and spragged it up with a small post from below at the other end. Of

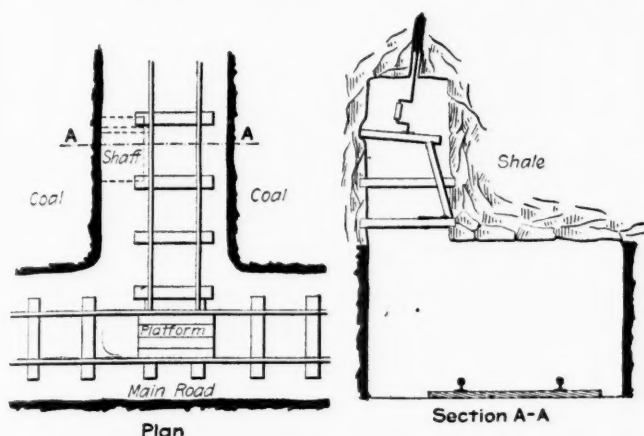
*Bankhead, Alberta, Canada.

*Carmangay, Alta., Can.

course, it required frequent adjustment. The accompanying drawing shows the arrangement.

As the work progressed, I cut hitches in the sides of the shaft and put short lengths of 2x6 across to act as a ladder for going up and down and to stand on while boring and charging the holes and while trimming up with a pick.

Owing to the fact that men were working near, and that the ventilation was poor, I could shoot only at night and occasionally at noon. Each shot advanced the hole about 18 in., and the face was carefully trimmed with a pick before shooting again. I used about $\frac{1}{5}$ lb. of black



PLAN AND SECTION OF THE SHAFT RAISED

powder to the charge and fired it with a squib. I never had a misfire and always had time to get out of the way.

To dispose of the rock I laid a square platform of 2-in. plank in the main roadway and put a track at right angles to the entry and extending to the foot of the shaft. Here I could load the rock blasted out quite easily, push it outside unaided and dump it without trouble.

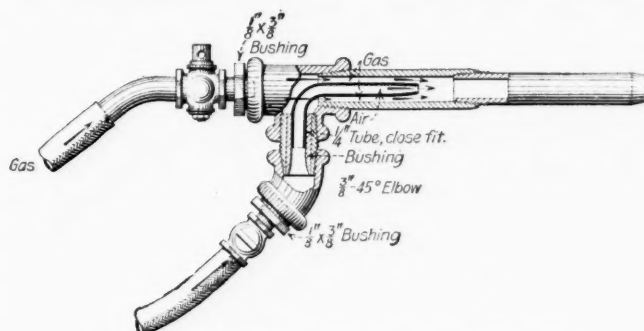
I do not know how many hours or days it took to complete the job, as I worked only at odd times when there was nothing else to do; but I do know that I never noticed the work or missed the time it took. I worked alone, utilizing spare time which would have been impossible had I been sinking from above. I needed no extra equipment and no extra help, both of which would have been required in sinking. Furthermore, it was never cold inside, while outside the temperature was frequently 20 deg. below and the ground frozen 2 ft. deep and freezing deeper every night.

I can recommend this method to any one situated as I was at that time.

Blowpipe Made from Pipe Fittings

The illustration, by H. H. Parker¹, in *Power*, shows a blowpipe for soldering, brazing, etc., made from pipe fittings. A copper or brass tube about $\frac{1}{4}$ in. diameter is filled with melted lead and given a right-angle bend so that it will go into a $\frac{3}{8}$ -in. tee as shown, after which the lead is melted out. A brass or fiber bushing is then driven into a $\frac{3}{8}$ -in. short nipple and drilled out to take the bent tube, which should make a close working fit, and the tube is driven into the bushing and the bushing screwed into the tee, the tube turning in the bushing while the nipple is

being screwed in. A $\frac{3}{8}$ -in. nipple about three inches long is then screwed into the end of the tee over the air nozzle, and a $\frac{1}{4}$ x $\frac{3}{8}$ -in. bushing is screwed into the other end. The air tube should be adjusted centrally in the $\frac{3}{8}$ x $\frac{3}{8}$ -in.

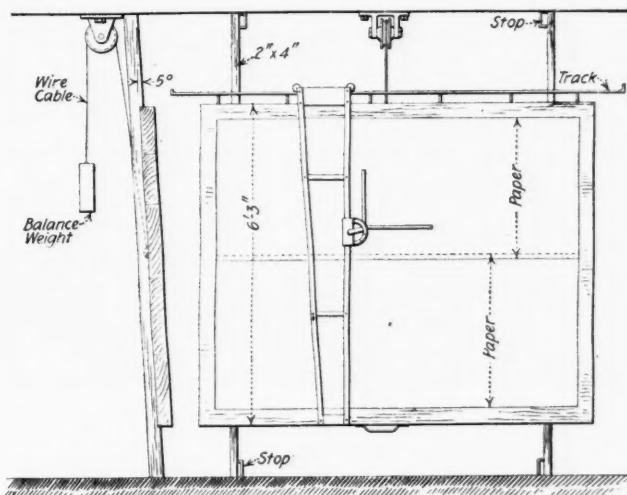


BLOWPIPE ASSEMBLED READY FOR USE

nipple. Valves or cocks are used to regulate the flow of air and gas into the nozzle. The apparatus has been found to work best when the air flows through the bent tube as shown and the gas is led through the straight portion of the tee. Any size or shape of nozzle may be used, depending on the character of work to be heated.

Drawing Board for Large Drawings

An arrangement of drawing board for handling large drawings which has been used satisfactorily for several years is described by H. E. Beard in the *American Machinist*. The outfit consists of a large board and a standard make of drafting instrument, as shown. The board can be made any length to suit the individual case. They have been used 8, 12 and 16 ft. long. The arrange-



ARRANGEMENT OF THE BOARD FOR LARGE DRAWINGS

ment can be raised or lowered by using the foot in the stirrup fastened to the bottom edge.

The paper, after two strips the required length have been cut and pasted together, is held on the board with a few thumb-tacks placed about 12 in. from the top edge. It is then dampened with a piece of waste dipped in water, after which the edges are coated with mucilage, the tacks are removed, and small wooden strips are nailed on, to hold it until dry and ready to use. When fastened to the board in this manner, the paper gets very tight and makes a good smooth surface to draw on.

¹Oakland, Calif.

A Kentucky Washery

BY NEWELL G. ALFORD*

SYNOPSIS—A sluice washer and a jig failed to give satisfactory results. A bumping table washer was finally adopted and is ridding refuse slack of a large part of its impurities. This is the only washery now in use in western Kentucky.

The particular motive that prompted the first washing of western Kentucky coals was a desire to manufacture a commercial coke from slack wasted at the mines through the preparation of the coal for the market. In the early period of western Kentucky's coal mining, its market called almost entirely for the larger sizes; hence the discarding of the screenings.

J. B. Atkinson, the late president of the St. Bernard Mining Co., was the man who first solved the problem of recovering western Kentucky's waste slack on a com-

mercial scale. The western Kentucky coalfield was yet in its infancy. A trough, or sluice, washer was built 30 ft. long, 2 ft. wide and 1 ft. deep, with an inclination of 1½ in. per foot. In connection with the sluice washer two beehive ovens were constructed near-by, in order that the research might include coking trials on the washed slack.

With this type of washer, difficulty was encountered in keeping the water feed and the coal delivery adapted to each other. Many small particles of coal contained (and still contain) thin sheets of pyrites, and these particles were floated with the clean coal, passing off with it to the washed-slack storage. This process also required the use of an excessive amount of water.

A jig washer was then installed to rewash the slack coming from the sluice. It was evident that this process was too slow, the jig refusing to clean the coal except when it was fed in small quantities. Even then, not-

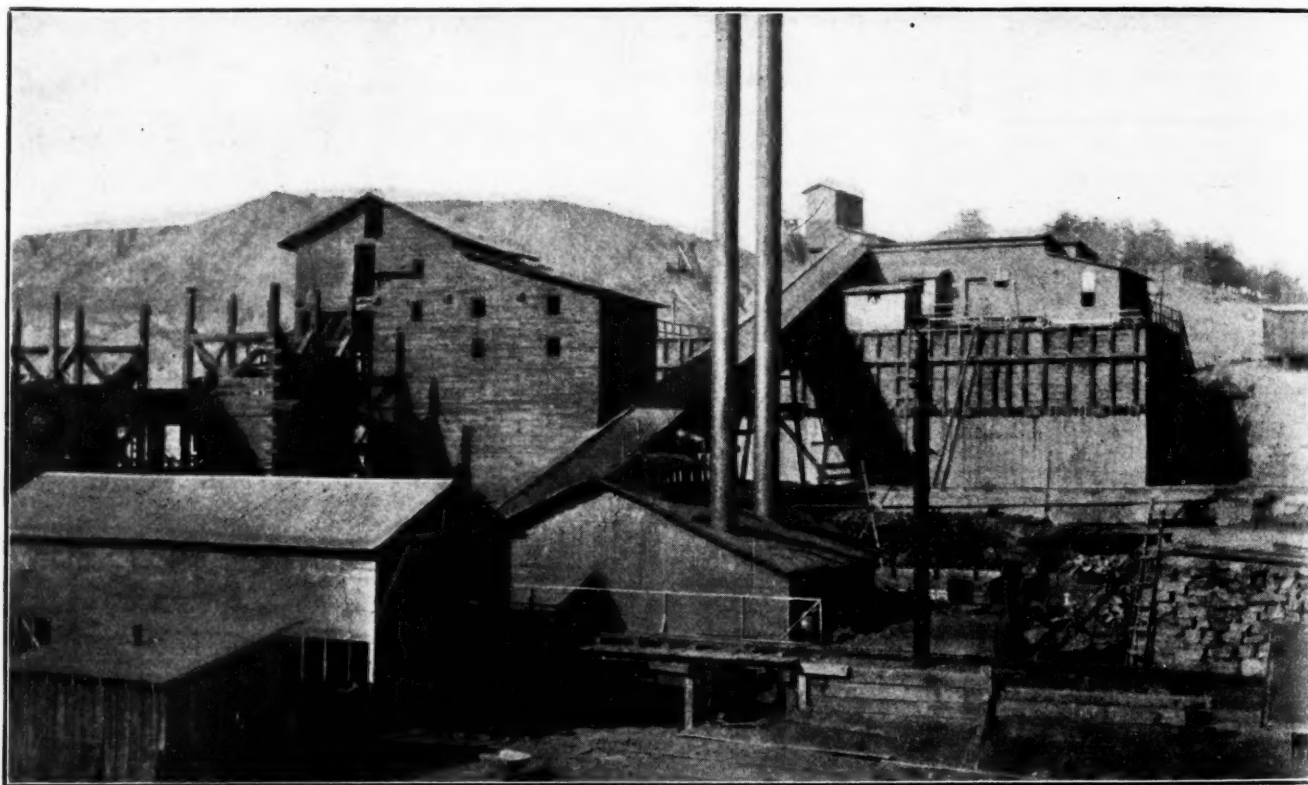


FIG. 1. ST. BERNARD MINING CO. WASHERY AT EARLINGTON, KY.

mercial scale that would be at the same time both practical and profit yielding.

Since the beds that yielded the output were classified as coking coals, Mr. Atkinson resolved to produce a coke which when crushed to small sizes—egg and chestnut—would find a domestic market as a substitute for the small anthracite sizes. As might be supposed, the waste slack passing through a ¾-in. screen contained the usual fireclay, slate and sulphur; and thus the fact was developed that a washer must be adopted that would materially decrease the percentage of these impurities in the resultant washed slack.

The St. Bernard Mining Co. began washing coal at Earlington, Hopkins County, Kentucky, in 1882, while

*St. Bernard Mining Co., Earlington, Ky.

withstanding the exercise of special care in operation, the pulverized pyrites filtered through the mechanism and passed off with the washed coal, thus failing to accomplish the purpose intended.

The best performance of this combination of washers sacrificed 4½ per cent. of the coal with the refuse, while the average operation discarded approximately 20 per cent. of the tonnage brought to the washery for treatment. The capacity of this preparation plant in 1889 was 100 tons per day, the coke-oven installation at this time being on a commercial scale. The process used approximately 1250 gal. of water per ton of raw slack.

Following this, slack from the No. 9 and No. 11 beds (it was Mr. Atkinson's purpose to utilize these in equal portions) was shipped to Birmingham and Pittsburgh.

where test washings were conducted in other types of jigs. Although the test washings on these machines removed a large percentage of impurities, they did not show a saving of coal commensurate with their dirt-removing properties.

In the meantime, September, 1891, Prof. A. C. Campbell, of Nashville, Tenn., came to Earlington with a model of his ore-concentrating table, a machine of the impact type. Arrangements were immediately made for

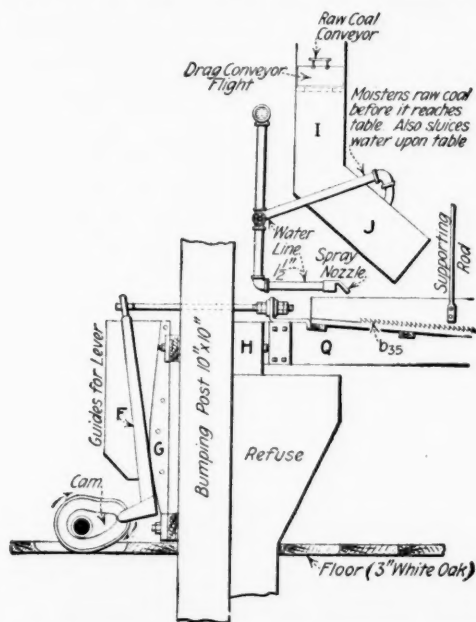


FIG. 2. OPERATING GEAR OF BUMPING TABLE

testing out this machine, and it was found that the Campbell concentrator, or bumping table, would not only remove the well-defined pyrites, but the slime charged with fireclay and sulphur as well.

The surface of the table, which is 30 in. wide and 8 ft. long, is supported by a keel extending from end to end. As shown in Fig. 2, which illustrates a longitudinal section of the table, the bottom presents an irregular curve, which was developed by Professor Camp-

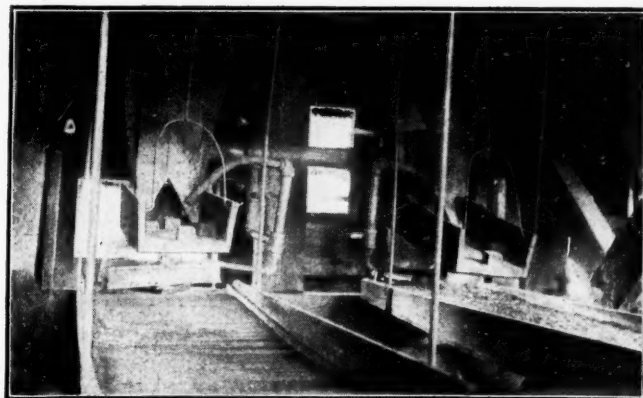


FIG. 3. BOTTOM OF CAMPBELL TABLE

bell, through experiment, as being of the most efficient form. The curved surface is covered with galvanized sheet iron.

The bottom of the table, as just described, is overlaid with strips of wood such as b35, the cross-sections of which are trapezoidal. The saw-tooth surface thus constructed is next covered by narrow strips of No. 10 galvanized sheet iron, which project slightly beyond the edges of the wooden strips, or riffle boards.

The sides of the table, the tops of which are parallel to the keel, extend from the bottom upward and act as containers when the apparatus is in action. With the exception of the strips b35, which are made of poplar, the table is constructed throughout of solid white oak.

When in operation, the camshaft revolves clockwise, simultaneously revolving the cam, which through the action of the beam *F* on the rocker *G* controls the direction of motion and transmits power to the table. A reciprocating motion is thus imparted.

The raw slack is fed upon the table through the hopper *I*, which is below the scraper conveyor that runs transversely above the battery of tables. The lower end of the hopper is in the form of a chute, as *J*, from which the slack is sluiced upon the table by a 1½-in. water line. Water is also fed upon the table at the refuse end *Q* by a second 1½-in. water line in a spray.

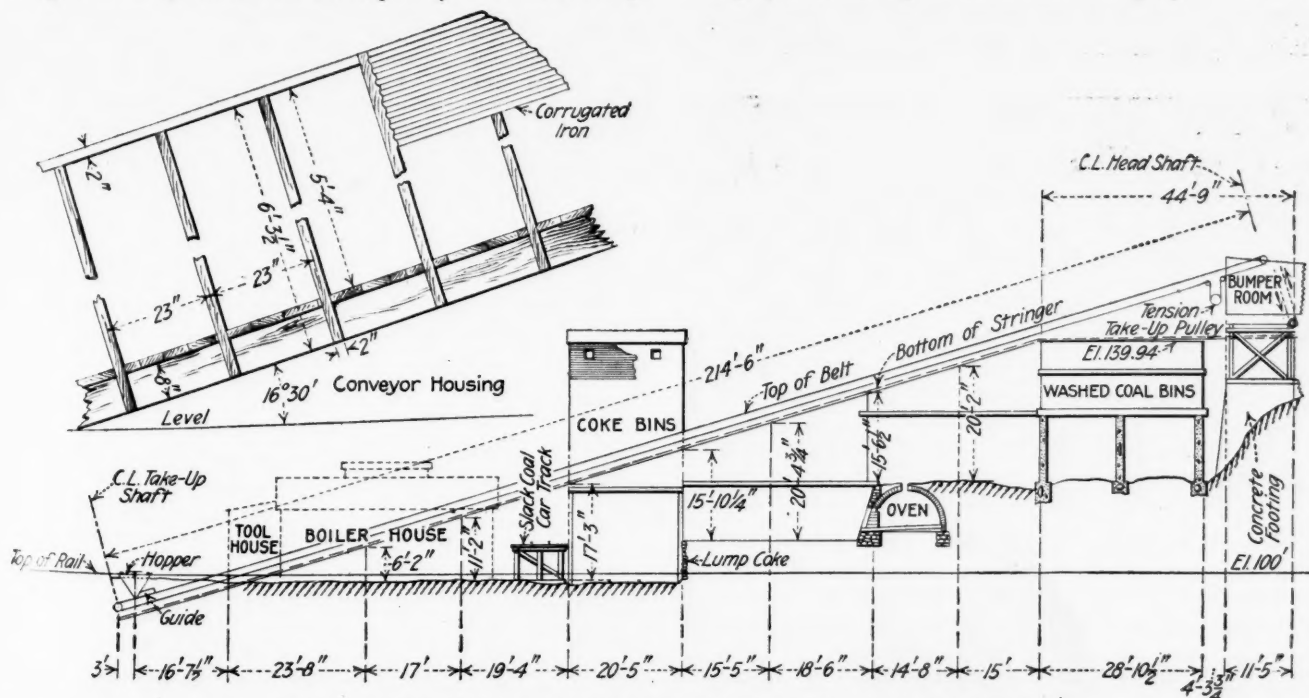


FIG. 4. SECTIONAL ARRANGEMENT OF CONVEYOR AND WASHERY

The raw slack, being deposited regularly upon the surface of the table, is submerged in 4 in. of water or less, according to the variation in curvature of the bottom. By virtue of their varying specific gravities, the particles then seek definite relative positions, the impurities sinking to the bottom, the clean coal rising to the upper stratum.

At the beginning and during the first part of the rotation, the cam, through the action of the beam on the rocker, generates a slow backward movement in the table toward the face of the bumping block *H*. As the

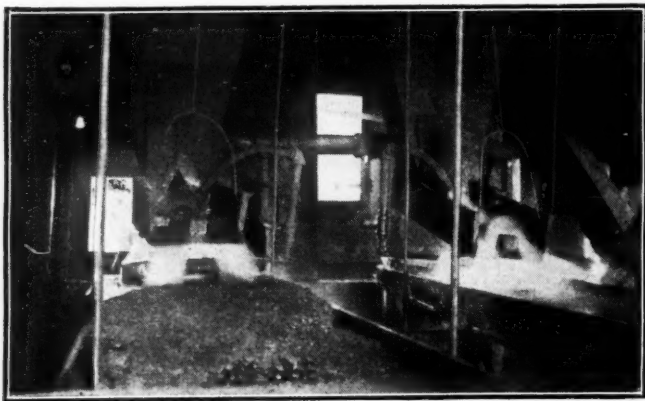


FIG. 5. TABLE IN ACTION, SHOWING APPLICATION OF WATER

end *Q* approaches the bumping block, the velocity of the table accelerates swiftly, being suddenly and momentarily brought to rest through impact with the block, thus ending the stroke. The continued rotation of the cam then imparts a sharp reverse motion to the table, the speed being lessened in successive degrees until the completion of the reverse stroke, where the cycle of movements begins anew.

The impact of the table with the bumper block diverts the heavier substances toward the rear, or refuse end, of the table, the refuse being discharged at *Q*.

This action on the part of the denser substance is augmented by the saw-tooth character of the table bottom. When certain of the heavier particles, in the course of their progress toward the end of the table *Q*, come to

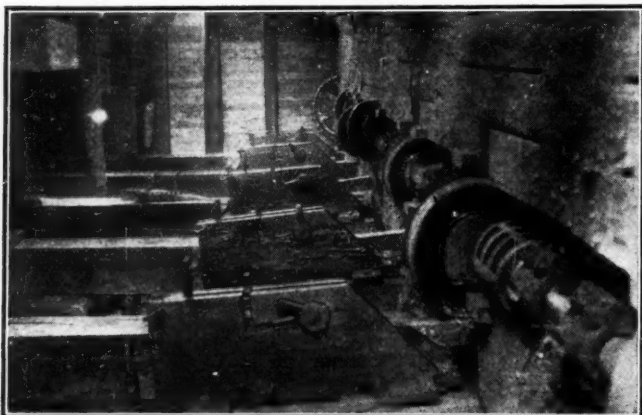


FIG. 6. CAMSHAFT FOR BATTERY OF BUMPING TABLES

rest on the bottom of the table, through the momentary suspension of motion, they seek shelter under the galvanized strips. When the table is thrust away from the bumping block *H*, these strips prevent the backward movement of these particles along the bottom of the table

in the direction whence they came. Thus this function of the strips permits the refuse to move on the table bottom in but one direction. The reverse motion disburdens the table of the clean coal at the front end.

From their respective points of discharge from the table, the coal associated with water and the refuse in similar mixtures are conveyed by gravity in slightly sloping troughs to their respective bins.

It is estimated that one-fifth of the water supplied to the tables passes off with the refuse, while the remaining four-fifths flushes the washed coal into the storage bins. Here the water gradually drains off through perforated wooden boxes located vertically along the sides of the bins.

As is obvious, the larger portion of the water is released at the lower end of the table, with the washed coal, necessitating but a slight fall in the conveying troughs to the washed-slack storage. On the other hand, since the refuse, although extremely wet, is possessed of distinctly adhesive qualities and in addition is accompanied by much less water than the coal, a heavier inclination is required to deposit the mixture in its temporary bin below the floor of the washery building.

From the temporary collecting bin the refuse is dumped, in quantities averaging $1\frac{3}{4}$ tons, into a wire-rope tram



FIG. 7. CABLEWAY FOR REFUSE DISPOSAL

bucket. A single bucket, running on a $1\frac{1}{2}$ -in. cast-steel rope, propelled by a $\frac{5}{8}$ -in. continuous cast-steel wire rope and a 60-hp. link-motion engine, conveys the refuse from the washery to the summit of an ascent about 75 ft. above the washery floor line. At this point an automatic tripper deposits the contents of the bucket in a hopper, which in turn discharges to a mule-drawn dump-car. The refuse is by this means deposited on a gigantic waste heap.

The determinations given in Table I are derived from the investigation of the writer on the battery of five machines now in service at the Earlington plant.

TABLE I. RESULTS OF WASHING

Identification of Sample	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	B.t.u. Dry	B.t.u. as Received
Equal portions of No. 9 and No. 11 raw slack coal.....	4.81	35.35	40.77	19.07	4.18	11,019	10,489
Above mixture washed.....	15.80	32.84	42.39	8.97	2.82	12,755	10,739
Refuse.....	9.92	23.49	20.08	46.51	8.80	4,744	4,273

NOTE—Specific gravity of refuse in this case was 2.03.

OPERATING DATA

Size of coal from tippie.....	Passes $\frac{1}{2}$ -in. screen
Size of coal as washed.....	Passes $\frac{1}{2}$ -in. screen
Speed of camshaft.....	67 r.p.m.
Water consumption.....	300 gal. per ton of raw coal

The present installation was completed June 1, 1913, at which time it superseded the previous plant constructed in 1898. From drop-bottom railroad cars, in

which it arrives at the plant, the slack passes through a hopper, below the track, onto a 20-in. belt conveyor furnished by the Link Belt Co. The carrying side of the belt is supported by standard troughing rollers. This conveyor is 214 ft. 6 in. from center of foot pulley to center of head pulley, and when operating at a speed of 350 ft. per minute on its vertical angle of 16 deg. and 30 min. will elevate pea and slack coal at the rate of 100 tons per hour from the hopper to the washery. Twelve horsepower is required for this operation.

The belt is maintained taut by a tension take-up pulley, located immediately below the head pulley and resting on the return belt. Rawhide lacing at the joint of the belt has proved quite satisfactory. Infrequent renewal of lacing and refilling of oil cups is absolutely the only



FIG. 8. HEADFRAME AND REFUSE HOPPER ON CABLEWAY

attention which this installation has demanded since the day it was put in operation, 3½ years ago.

Upon its discharge from the upper end of the belt, the coal falls into a storage bin, whence it is lifted by a bucket elevator and dumped upon a drag conveyor with metal flights. This drag conveyor, as before stated, passes transversely above the battery of bumping tables and serves to supply them with raw coal. The washer-room shafting and the belt conveyor are propelled by a 60-hp. slide-valve engine.

The succeeding stage is that of washing, hereinbefore described.

The water-supply for the washing process is pumped to a concrete reservoir, with a capacity of 46,750 gal., from which there is a vertical fall of 37 ft. to the roof line of the washery building. Approximately 300 gal. are required for the treatment of 1 ton of raw coal.

With but one exception, the St. Bernard Mining Co. is the only organization thus far that has attempted washing western Kentucky coal. In 1895 the Ohio Valley Coal and Mining Co., at DeKoven, Ky., operated a plant equipped with two jigs. This plant treated slack from the No. 9 bed only, and has since abandoned washing.

Immense Coal Measures of Colombia*

Buenaventura, a maritime port of the Pacific, is the strategic outlet for the stone coal of the adjacent beds of the Cali region in Cauca Valley, in the Republic of Colombia. With the Panama Canal now permanently available for use, the port will afford many advantages for shipment on a large scale, as its deep and well

protected harbor lies only 150 miles to the south of Panama, directly on the future steamer route connecting Chile, Peru and Ecuador with Europe and the United States.

Apart from these favorable factors, Buenaventura will become a convenient intermediate coal station for those carrying on trade with Australia, the Oriental countries and Europe, although to date little has been done to exploit those vast beds of coal, except for a few developments begun in the neighborhood of Cali, in the Department of the Cauca.

The greatest extent of the carboniferous vein in this part of the country is from northwest to southeast, inclining 80 deg. toward the east, though in many places the stratification of the veins is found to be practically in a vertical position. There have been discovered superficial measures of mineral coal which extend a distance of 40 miles in all directions, the thickness varying from a few inches to 15 ft. and crossing the Andes diagonally. There are reasons for believing that the measures of coal and lignite of Choco—little known at present—are but a continuation of the Cali deposits, and also that those of the bay at Point Utria on the coast itself are the same. The latter lie about halfway between Panama and the port of Buenaventura.

Almost nothing has been done so far to develop and exploit these extensive deposits of coal and lignite in the Choco region, and it is even probable that the inhabitants of the country are unaware of the vast extent of these important deposits. Through the development and exploitation of the deposits of gold and platinum, which also exist in these regions, it may be that the coal measures will become useful in the production of motive power, and thus lead to the full development of these extensive sources of wealth. If proper advantage is taken of her resources, Colombia should advance rapidly as a producer of valuable minerals, and particularly as a source of combustible material, with which nature has generously endowed her.

Colorado's Coal Production

Increases and decreases in Colorado's coal production in 1916 as compared with 1915 are given below:

Counties	1915	1916	Increase	Decrease
Archuleta.....	1,255			1,255
Boulder.....	971,360	1,061,250	89,890	
Delta.....	77,840	76,986		854
El Paso.....	297,881	313,184	15,303	
Fremont.....	493,024	592,091	99,067	
Garfield.....	142,959	132,540		10,419
Gunnison.....	440,964	511,755	70,791	
Huerfano.....	1,597,828	1,811,585	213,757	
Jackson.....	26,981	43,656	16,675	
Jefferson.....	126,953	149,522	22,569	
La Plata.....	117,392	111,406		5,986
Las Animas.....	2,985,661	4,154,334	1,168,673	
Mesa.....	95,803	132,442	36,639	
Moffat.....	200	200		
Montezuma.....	842	2,855	2,013	
Montrose.....	846	922	76	
Pitkin.....	51,289	41,513		9,776
Rio Blanco.....		4,775	4,775	
Routt.....	846,459	919,895	73,436	
Weld.....	439,860	461,274	21,414	
Totals.....	8,715,397	10,522,185		

The increase in 1916 was 1,806,788 tons.

Two Small Briquette Plants Operating in Philadelphia—
The American Briquette Co. is operating a three-ton-per-hour roll press in Philadelphia intended primarily to demonstrate the Hite binder, a patented process in which the bond is obtained by means of an emulsion of oil and starch. The American Coallette Co. is another concern in Philadelphia that operates a 5-ton-per-hour roll process. It uses a secret binder, said to be both smokeless and weatherproof. Other plants are under way at Harrisburg, Penn., and Trenton, N. J.

*Translated from latest Geological Report for Colombia.

Methods Adopted in Stripping Anthracite*

BY J. B. WARRINER†

SYNOPSIS—The development of anthracite stripping. Ratios of overburden to recovered coal vary between 1 to 1 and 5 to 1. Force and outlay required for stripping. Methods adopted and further possible improvements in system. Anthracite stripping costs from 16c. to 20c. per cu.yd. for clay and 35c. to 40c. per cu.yd. for rock.

Stripping is the name given to the operation of removing clay, rock or other cover from deposits of coal or ore. This paper will describe the stripping methods used in the anthracite regions of Pennsylvania.

In so doing, those practices which differ in different sections of the region, or are susceptible to change or improvement, will be principally considered, though the purpose is to give as complete data as possible concerning all stages of the development of stripping.

The information from which this paper has been prepared was collected and is now submitted by a committee representing the larger users of stripping methods, of which committee I have acted as chairman. Data and assistance have also been obtained from many mining men, engineers and contractors, and from manufacturers of stripping equipment, to all of whom our appreciation is due.

EARLY HISTORY AND STATISTICS

The earliest mining operation on a commercial scale in the anthracite region was a stripping. This was the famous Quarry mine at Summit Hill. Stripping was used only because no other way of mining a deposit of the nature found there seemed feasible to the early operators. A description of this stripping from a report published in 1821 is as follows:

The coal mine at present worked by the company lies on the top of a mountain, and appears to extend over some hundred acres of land covered by about 12 ft. of loose black dirt

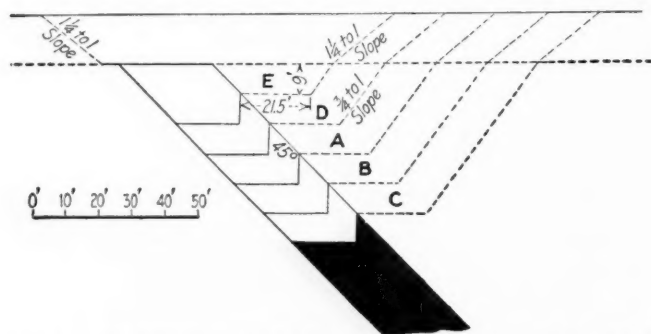


FIG. 1. DIAGRAM DIFFERENTIATING PROFITABLE AND UNPROFITABLE STRIPPING

resembling moist gunpowder, which can be removed by cattle with scrapers, and thrown into the valley below so as never to impede the work. The thickness of the coal is not known, but a shaft has been sunk in it 35 ft., without penetrating through. More than an acre of mine has been uncovered and presents a huge rock of coal, which is easily quarried without blasting.

There is also an early record of a similar quarry at Beaver Meadow, and there may have been others the

record of which has not come down to us. After these first strippings, however, no other such operations were recorded for many years. The first strippings, as we now know them, were commenced about 1864, when William Milnes carried on a hand-stripping operation at Jeanesville. Even this was a comparatively isolated instance and not until the late '70's did such operations become a general practice.

About 1874, strippings were carried on at Beaver Meadow and in the Panther Creek valley, as well as in other parts of the region. Thereafter, throughout the middle and southern fields until the advent of steam shovels, and afterward, immense quantities of overburden were removed in strippings, as is attested by numerous overgrown and forgotten spoil banks yet remaining along the hillsides of the coal valleys.

The literature of anthracite strippings, which is meager, begins about this time with articles in technical journals descriptive of certain individual operations. Also, in the records of the Second Geological Survey of Pennsylvania there is a report by H. M. Chance on Anthracite Mining Methods and Appliances, published in 1883, which gives interesting plates and descriptions of early strippings.

The United States Geological Survey has recently commenced to collect stripping data for the anthracite and bituminous fields, but the anthracite record is yet very incomplete, owing partly, at least, to a lack of detailed information in the reports furnished by the anthracite operators.

PROGRESS IN STRIPPING METHODS

The earliest strippings were all hand excavations, and the methods employed were much the same as those now used for very small operations. The work consisted merely of digging out the stripping area with pick and shovel and removing the excavated material to the nearest available dumping place in carts or wheelbarrows.

Horse-drawn scrapers were used in the larger jobs, some of which were extensive. Where the stripping became of considerable depth, and especially in rock, a horse-operated derrick was used to elevate material from the lowest levels.

The first steam shovel came into the anthracite region in 1881 and was used at Hollywood by L. E. Klotz, contractor for C. Pardee. This was 6 years earlier than the first date on which steam shovels were used in ore mining in the United States. It was one of the early type of Oswego shovels with a dipper of 1 yd. capacity and weighing 30 to 35 tons.

The next shovel was used by J. W. Crellin at Silver Creek. This was larger, and operated a dipper of 1 1/4 yd. capacity. Shovels came into use rapidly after this and this general type of equipment has remained in use since, though the sizes of the shovels have gradually increased until now 70- and 80-ton shovels are the rule, and larger equipment is coming in.

During the latter part of the '90's some experiments with aerial tramways were made, but their capacity proved low and they were soon abandoned. These have also been tried in ore-mine stripping with equal lack of

*Article read before the American Institute of Mining Engineers at its New York meeting, Feb. 21, 1917.

†Chief engineer, Lehigh Coal and Navigation Co., Lansford, Penn.

success, though they are used almost to the exclusion of other equipment in quarries.

Anthracite strippings are a notable example of the way in which labor-saving devices have held down operating costs in the face of steadily advancing wages. In the early days when \$1.10 was the regular wage for a 10-hour day, unit stripping costs were around 26c. per cu.yd. for clay excavation and 60c. for rock.

With present wages nearly double the early rate, stripping costs range from 16c. to 20c. for clay and from 35c. to 40c. for rock. This combination of higher wages and lower costs is due, largely, to the use of steam shovels and to the increase in the size of the shovels employed.

Stripping is at the present time, and has been for many years, one of the most important adjuncts to the mining of anthracite coal. In the northern regions—that is, the Lackawanna and Wyoming valleys—stripping methods have been employed but little, because the veins are, as a rule, of limited thickness, and also because the pitch is so light as to render crop strippings unnecessary.

In certain parts of these regions, however, these generalities do not hold good, and stripping methods could be employed to economic advantage. Already a few areas have been stripped and others are contemplated.

In the middle and southern fields, on the other hand, strippings are an essential part of mining operations and form about 5 to 10 per cent., on a tonnage basis, of all mining done in these regions.

IMMENSE QUANTITIES OF MATERIAL MOVED

During the year 1914, the total yardage removed in stripping operations in the anthracite regions was 8,370,174 cu.yd. About 5 per cent. of this yardage was in hand strippings and 95 per cent. in those operated by steam shovel. Owing to the fact that a great deal of this work is done by contract on an unclassified basis, the percentage of rock removed as compared to other overburden is not obtainable, but it is approximately 35 per cent.

In the years since stripping operations were commenced in the anthracite region it is probable that at least 300,000,000 cu.yd. have been removed by stripping. Moreover, this figure does not include coal excavated from stripping areas by hand and by steam shovels, which is a substantial quantity.

Immense quantities of overburden have been removed in individual stripping operations in the anthracite field and some of these operations have extended over many years. Strippings involving the removal of one or two million cubic yards, and even more, are not unusual, and some of these have been in continuous operation from 12 to 20 years.

To arrive at the record in respect to continuous operation, however, it is necessary to go back again to the old quarry mine at Summit Hill. This was in operation nearly 30 years, and the total output of coal from it reached nearly 2,000,000 tons. In cubic yards of overburden removed, however, and in depth of excavation, this old operation does not compare at all with more modern ones. The total excavation in the largest modern anthracite stripping is 4,500,000 cu.yd. exclusive of coal, with a surface area of 53 acres and a maximum depth to the top of the coal of 150 feet.

The economical problem of producing the largest quantity of coal for the least expenditure of money can be assigned as the fundamental reason for the employment of

stripping methods. There are, however, many factors in addition to this fundamental one.

A higher yield of prepared sizes is usually obtained by mining the coal in the open under conditions of natural light; a cleaner product is obtained for the same reason and also because of the removal of overlying impurities; also, the total output of a colliery can be increased by this method and fluctuations of output eliminated for the reason that the entire body of coal is thus exposed to view and can be attacked in few or many places as desired.

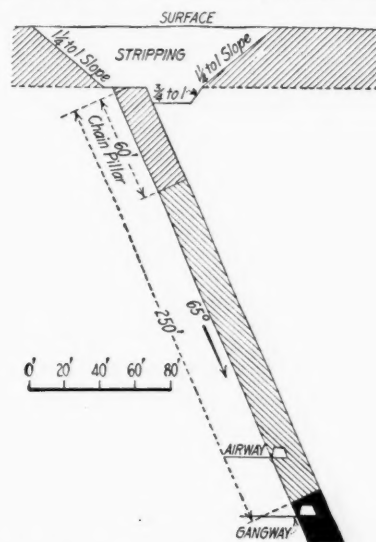


FIG. 2. STRIPPING A DIPPING SEAM TO RECOVER OUTCROP CHAIN PILLAR

It is usually one or the other of these considerations that determines the stripping of any area. In some cases these are such potent reasons as to induce the stripping of certain areas even where the profitableness is otherwise doubtful. In certain cases conservation, also, is a consideration of some influence.

Strippings on an economic basis, however, fall into two general divisions: Those that are undertaken to obtain coal at a cheaper cost than can be obtained by ordinary mining, and those that are undertaken to recover coal that is unobtainable by ordinary methods, or obtainable only at a prohibitive cost.

The latter is the larger division, because unless the coal to be uncovered is to be mined by other than the ordinary chute methods of inside mining—and often when the coal is to be mined by other methods—the output from a stripping is obtained at a higher price than the average for the colliery. This is because the cost of mining is not appreciably decreased by uncovering the coal and because the cost of removing the cover must be added to the mining cost.

There are, of course, many stripping operations, wherein the unit cost or the cost per ton of coal obtained or recovered is less than the average cost of inside mining. These occur, however, when conditions are exceptionally favorable; when, for instance, the coal after being uncovered can be excavated by hand or by steam shovel at a low unit cost, which, added to the cost of removing the cover, is still lower than the cost of mining by ordinary methods. These cases, though numerous, are exceptions, and are undoubtedly becoming fewer in number.

It is, nevertheless, the preconceived idea of many people, even of some more or less intimately connected with coal mining, that coal is produced by stripping operations at

a greatly reduced cost over general mining operations. That this is erroneous in the majority of instances is shown by the fact that lessors of coal lands often lower their royalty rates in order to induce the stripping of areas that otherwise would remain unmined.

LIMITS IN AREA AND DEPTH

The economical limits of stripping in area and depth are affected by so many factors, that this question is without exception the most important to be faced in stripping operations, and the variations in the values assigned to these different factors by those engaged in stripping operations are the most marked of all differences in practice.

Some of the factors may be named, as: Quality of coal; margin of profit; classification of material to be removed; excavation of coal by chute mining, or by steam shovel; refuse to be handled, etc. As a rule the sum of the equation containing all of these is resolved for each operating company or district into an empirical ratio of cubic yards of cover to tons of coal which is then applied to other stripping work with perhaps slight variations to allow for local changes in conditions. Such a ratio once established for any region or operation sometimes remains unchanged for a long period and is applied in turn to each new stripping operation that presents itself.

This method is not incorrect, and in most cases it serves as well as a more complicated calculation; but there are many possibilities of a failure in the basic principle if a false value has been assigned originally to certain factors, or if certain factors have been neglected. Suppose, for instance, that it is decided to expend on coal recovered from the stripping shown in Fig 1 an amount per ton equal to the average margin of profit of the colliery, the return on the investment being considered to be secured by certain factors or advantages that do not lend themselves readily to calculation in exact figures.

Perhaps the output is falling off, or possibly the coal to be uncovered is of exceptionally good quality and may improve the car yield of the colliery a point or two. Then this cost per ton figure is translated into a ratio of cubic yards overburden removed per ton of coal uncovered, say, still merely as an instance, $2\frac{3}{4}$ yd. per ton. Then the limits in area and depth are set to produce this ratio. This, on its face, appears to be satisfactory, but not when the operation is resolved into component parts as is shown on this diagram by the dotted lines.

PROFIT OF STRIPPING SHOULD NOT BE AVERAGED

There, the lowest component part which comes within the limits of the ratio is marked *A*. The component parts *B* and *C* are 3 cu.yd. per ton uncovered and $3\frac{1}{2}$ cu. yd. per ton uncovered, respectively, and their average is $3\frac{1}{4}$ cu.yd. per ton. In other words, they are operated at a loss, regardless of the fact that component parts *D* and *E* are operated at a considerable profit. It is required that certain marked advantages be gained by the removal of *B* and *C* to justify this operation. In these days of increasing costs of coal and narrow margins of profit, conservation can hardly be considered one of these advantages.

Another condition is illustrated in Fig. 2. This is a crop stripping of a character common to the southern fields, where the clay and gravel overburden must either be removed or a chain pillar of coal left below the surface to prevent the contamination of the prepared coal. It is to

be assumed that the stripping is for an entirely unworked area. Under the conditions roughly outlined in that illustration it would be necessary to leave a chain pillar about 60 ft. long if the surface material were not stripped off.

The coal below this chain pillar can be mined at as low a unit cost for cutting and loading as would be obtained by mining all the coal from the gangway to the surface, provided the cover were removed. By the latter method lower unit development costs would be obtained, but the reduction would amount in this case to only a few cents per ton.

Still, taking $2\frac{3}{4}$ cu.yd. of overburden to 1 ton of coal as our economical ratio, we find the ratio in this illustration to be 4 cu.yd. to 1 ton of coal in the chain pillar, and 1 cu.yd. to 1 ton of coal in the entire area between the gangway and the surface. The coal that can be strictly classed as stripping coal is therefore secured at a loss, and assuming that no other factors need be considered, the stripping should not be undertaken.

Of course, in presenting this illustration, I do not have in mind certain veins in the southern anthracite fields that are very thick and the coal in which is so loose and

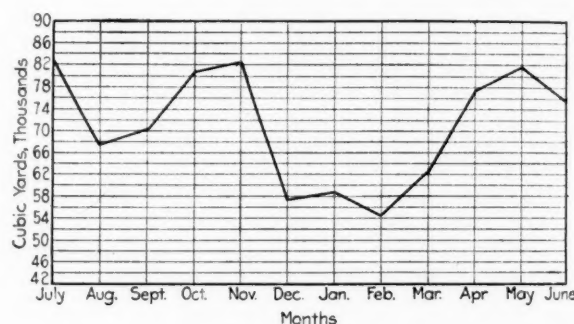


FIG. 3. DIAGRAM SHOWING STRIPPING ACTIVITY BY MONTHS

friable that any excavation in them is likely to cause a run of the coal that does not stop short of daylight. A chain pillar is obviously of little value in such a case, and if the coal is to be mined at all it must be stripped.

These are only two instances of the possibilities of fundamental error in making preliminary calculations, but they serve to illustrate my point. In general, in the anthracite region, veins that are too thin to be worked at a profit are not mined, even though such mining might

TABLE I

Pitch, Deg.	Thick-ness of Vein, Ft.	Remain-ing, Per Cent.	Pitch, Deg.	Thick-ness of Vein, Ft.	Remain-ing, Per Cent.
1-15 to 25	10 to 20	55	9-35 to 45	Over 30	55
2-15 to 25	20 to 30	60	10-45 to 60	10 to 20	40
3-15 to 25	Over 30	65	11-45 to 60	20 to 30	50
4-25 to 35	10 to 20	50	12-45 to 60	Over 30	55
5-25 to 35	20 to 30	55	13-60 to 80	10 to 20	50
6-25 to 35	Over 30	60	14-60 to 80	20 to 30	55
7-35 to 45	10 to 20	40	15-60 to 80	Over 30	60
8-35 to 45	20 to 30	50			

not cause the colliery to be operated at a loss. Stripping operations should undoubtedly be treated in the same manner.

In Figs. 1 and 2, the veins were assumed virgin in order to simplify the explanations. Unfortunately, the majority of large strippings are of veins worked and reworked in days past in such a way that an accurate calculation of the amount of coal remaining is impossible. The problem of the economy of stripping them can only be solved by a guess, as is done where contracts are let on the basis of payment by the ton for coal recovered.

Fortunately, however, many strippings of worked-over areas have been completed at this time, or are so far advanced that a record of the coal actually recovered or remaining in the worked-over areas can be obtained. A provisional tabulation has been made of all these records that are available, which gives the average results shown in Table I. Some of the figures from which this tabulation was derived are given in Table II.

TABLE II

Kind of Stripping	Thickness Vein, Ft.	Pitch, Deg.	Extent Worked	Percentage of Original Coal Remaining
Anticline	55	20	Robbed and robbed	60.0
Crop	50	60 to 80	Mined and robbed	60.0
Anticline	40	15	Mined and robbed	50.0
Crop and basin	40	40	Mined and robbed	40.0
Crop	40	30	Mined and robbed	60.0
Crop	35	40	Mined and robbed	50.0
Crop	30	40	Mined and robbed	50.0
Crop	25	45	First mining	82.5
Crop and basin	25	20 to 50	First mining	70.0
Crop	25	20	Mined and robbed	50.0
Crop-3 splits	10	50	First mining	70.0
Crop	16	20 to 35	First mining	55.0
Crop	16	25 to 35	First mining	50.0
Crop	15	50	First mining	68.0

Tables I and II consist entirely of examples of stripping from areas mined 20 years or more ago. In more modern mining better extraction has been obtained, and this fact must be taken into consideration where the stripping of such an area is contemplated.

With all these factors to be considered, and with the varying margins of profit at different collieries kept in view, it can readily be seen that no universal ratio of yards of cover to tons of coal can be set as the profitable limit for stripping operations. At each operation this limit has to be worked out for itself.

The ratios in use throughout the entire region vary usually between 2 and 4 to 1, with an average of about 3 to 1. In some instances ratios as high as 5 to 1 have been used, but this means that the cost per ton, for stripping only, would be 80c. to \$1.50, to which must be added mining, preparation and overhead costs.

EQUIPMENT AND OPERATION—CHARACTERISTIC STRIPPINGS

The equipment required for a one-shovel operation is about as follows: One 70-ton shovel, three 18-ton locomotives, 20 five-yard dump cars, one star drill, one steam drill, one water tank, one boiler, one blacksmith shop, and the necessary rails, sills, pipe lines, tools, etc. The total capital outlay for such an outfit is approximately \$30,000.

The average force required to operate a one-shovel stripping consists of about 35 men, roughly as follows: One foreman, one shovel engineer, one craneman, one fireman, one watchman, two laborers, four jackmen, three locomotive engineers, one dump boss, six dumpmen, one track boss, two trackmen, two drillers and eight helpers, one boiler fireman, one blacksmith and helper, two coal diggers, one driver and one switchboy.

The wages paid these men amount to \$2100 per month. The shovel engineer is paid \$140 a month, the craneman \$95, locomotive engineers 25c. per hour. These rates are all subject, however, to the recent increases granted the mine workers, ranging from 7 to 15 per cent.

When a stripping is decided on and its limits staked out by the engineers, an inspection of the ground determines the method of opening it; usually the cuts at the higher elevations are made first. After that the problem is almost entirely one of transportation.

Steady operation of the shovel or shovels is the object to be secured. Everything must contribute to this end—tracks and rolling stock must be in good condition, turn-outs must be maintained, and the grades must be as easy as the nature of the ground will permit. If rock is to be removed, drilling and blasting must be kept well in advance.

The method of opening a stripping with either a Bucyrus 70-ton shovel or a Marion 60-ton shovel, which are the two types most widely used in anthracite stripping work, is as follows (Fig. 4): For the first cut the track is laid on the surface along one limit of the stripping, usually the bottom rock side, and the shovel cuts down grade alongside the track until a depth of 9 ft. is

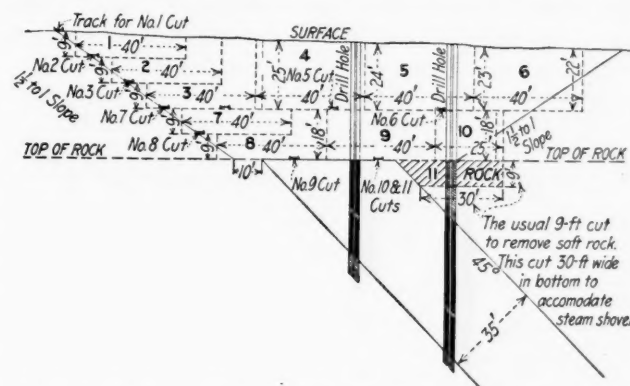


FIG. 4. SHOWING REMOVAL OF NECESSARY SURFACE IN 11 CONSECUTIVE LIFTS

reached, this being the maximum cut that the shovel can take and load overhead.

When the first cut is completed for the length of the stripping, the track is laid in this cut, and the shovel again cuts down grade until a depth of 9 ft. below the first cut is reached. The shovel then continues cutting toward the other limit, the additional depth being determined by the depth of surface over the vein up to 30 ft., which is considered the proper maximum height for a clay cut.

In working by the above method, it is necessary to leave a bench at least 13 ft. in width for the laying of the track. Local conditions, as a rule, render it impossible to maintain any such plan for the entire life of a stripping.

The first cut as described above is always the first made in a stripping except in the case of what is known as a side-hill stripping. Here the track is laid on the surface and the shovel started at an elevation that will give the required cut at the vertical limit.

Rock cuts are usually made from 22 to 25 ft. in height, though more recent practice is to keep the height down to 12 or 15 ft. This height depends somewhat on the nature and hardness of the rock. The lower height seems better for very hard rock, the reason being that the material, especially in the upper portion of the bank, is more completely broken up by blasting than it is when the cut is made higher. Consequently the rock is more easily loaded. A saving of 25 per cent. in cost per cubic yard is claimed for this method.

Drillholes for blasting are arranged in parallel rows, usually three, with the holes 12 to 20 ft. apart and the holes in adjoining rows staggered. From 15 to 25 holes are fired in a battery, or more if possible. After being drilled, each hole is "sprung" with a charge of from three

to eight sticks of 40 per cent. dynamite. By "springing" is meant the blasting of a pocket at the bottom of the hole to take a sufficient charge of black powder.

It is sometimes necessary to spring a hole two and three times. The charge of black powder then used varies greatly, according to the nature of the rock and the amount of powder that can be put into the hole. The pocket itself, and the hole for about 2 ft. above the pocket, is filled with powder and the remainder of the hole with clay or coal dirt.

For 25- and 30-ft. holes, "Star" type churn drills are generally used, the customary diameter being 4 in. In solid rock the progress is about 30 ft. per shift of 9 hours, or an average of $3\frac{1}{2}$ ft. per hour. For holes 12 ft. deep or under, a steam tripod drill is used and about double the progress of the churn drill, or $6\frac{3}{4}$ ft. per hour, is made.

The average costs for drilling and blasting per cubic yard of rock excavated are as follows:

	Cents
Labor, drilling and charging, depreciation equipment, etc.	4.5 to 6.5
Powder	5.5 to 8.0
	10.0 to 14.5

The tracks to the dump are always on an ascending grade of at least 1 per cent., though the grade is usually steeper. Four per cent. is common and grades as high as 7 per cent. have been used. The grade of the tracks in the stripping pit is governed by the necessary rise in elevation to reach the dump. The locomotives used vary in size up

Under proper conditions, outputs as high as 30,000 cu.yd. per month have been obtained for one shovel in clay. The average, however, is only about 18,000 cu.yd. for clay and 10,000 to 12,000 for rock. The output from strippings varies considerably according to the season of the year.

The curve shown on Fig. 3 illustrates this for the entire stripping operations of one company averaged by months over a period of 4 years. This curve, while affected by other factors, serves to illustrate the drop in output during the winter months.

If the stripping is not deep, all the excavated material can be removed by locomotives. In many cases, however, this is not feasible and hoisting planes must be resorted to. Practically without exception, even in the largest operations, these are single-track planes operated by small second-motion hoisting engines with a capacity of about 150 dump cars per day, or about the output from one shovel.

The problem involved in putting these planes down along the steep sides of the average pit is often a serious one. Some of the planes are anchored on a slope of 50 deg. to 60 deg. pitch by bars sunk into the solid rock to which the roadbed is tied. While nothing can be said against these small hoists for a one-shovel stripping, it is undoubtedly bad practice to use them in the larger operations employing two or more shovels.

There are practically none of these that cannot be laid

out so that the output from two shovels can be brought to the foot of one plane, and this plane should be equipped with a hoist capable of handling with ease 300 and more cars per day. This plane can have either a single or a double track, but the grade should be maintained at about 20 deg., which is the average for the single-track planes now in use. Some figures have been prepared showing how the costs of the two kinds of planes compare, taking a double-track plane handling only the output of two shovels, thus allowing the small hoist the maximum advantage in the comparison. The first cost of equipping a plane for a small hoist is low, as the hoist itself is usually

picked up secondhand around the collieries. It would be something as follows for a plane 300 ft. long:

Hoist	\$500
Tracks, track material, rope, etc.	700
Grading for hoist and plane	1,000
	\$2,200

For the double-track plane with the larger hoist the figures would be:

Tracks, track material, ropes, etc.	\$1,100
Hoist	5,000
Hoist house, pipe lines, etc.	800
Grading for hoist and plane	3,000
	\$9,900

To operate the single-track plane two topmen, two bottom men, one locomotive engineer, one hoist engineer, four men and a boss on the dump must be engaged, whereas the double-track plane would require three topmen, three bottom men, two locomotive engine men, one hoisting engineer and seven men and one boss on the bank.

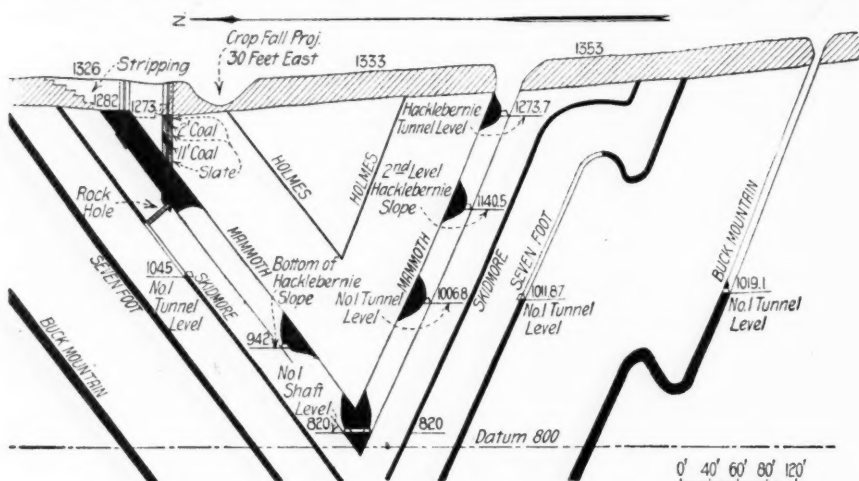


FIG. 5. STRIPPING WITH INSIDE MINING OF COAL ON DIP

to 20 tons, the latter being about the heaviest type that can be used safely on a dump of any height. A 20-ton locomotive will push ten $4\frac{1}{2}$ -cu.yd. cars on a 1 per cent. grade; eight $4\frac{1}{2}$ -cu.yd. cars on a 3 per cent. grade, and six $4\frac{1}{2}$ -cu.yd. cars on a 4 per cent. grade.

The general, and best, practice in building stripping tracks is to use 60-lb. rails and nothing under a No. 6 frog. Curves should be kept under 10 deg., though 20- to 25-deg. curves are used, especially in forming a dump.

Dumps are made of all heights and sizes, though there is less maintenance cost with heights of about 25 ft. Dumps of greater height settle and slip easily, especially in wet weather.

The cars most widely used in stripping work are the Eastern and Western type side-dump cars. The Eastern type is of $4\frac{1}{2}$ to $5\frac{1}{4}$ cu.yd. capacity and the Western type of 4 cu.yd. Some 8- to 10-cu.yd. cars are in use and the results obtained seem to be satisfactory.

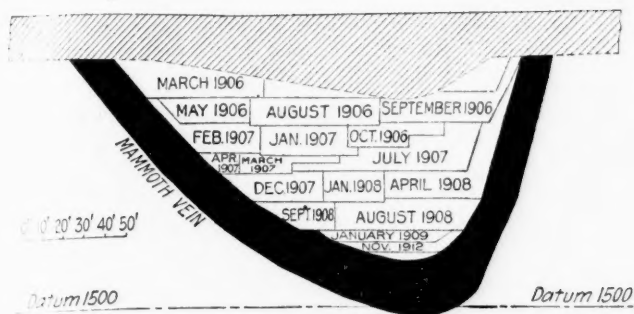


FIG. 6. UNCOVERING A SHALLOW DIP

The comparative cost would be as follows:

	Single Track	Double Track
Labor per day	\$17.88	\$26.21
Power	4.30	6.48
Interest and depreciation, 15 per cent	1.00	4.00
	\$23.18	\$36.69

Figuring 150 cars for the single-track plane, the operating cost per car would be 15.5c. and at 300 cars for the double-track plane 12.2c. or a difference of 3.3c. per car.

The location of the limits for a stripping are set on a line where the normal slope of the overburden figured from the bottom of the final cut intersects the surface. Naturally a shovel cannot cut to any such slope and must accomplish the same result by a series of steps such as shown in Fig. 4. The normal slope that earth of clayey nature will take is about 1 to 1. Sandy ground requires $1\frac{1}{2}$ to 1 or even 2 to 1, while rock can be cut nearly vertically if the height of bank does not exceed one shovel cut. For greater depths, $\frac{1}{2}$ to 1 must be allowed or even 1 to 1 if the rock is of a shaley nature. The importance of having the foot of the stripping slope well back from the bottom rock of the coal, to prevent the washing of overburden into the exposed vein by rains, is very great. The standard width for this ledge or berm is 10 to 15 ft. This also is shown in Fig. 4. Figs. 5, 6 and 7 illustrate crop, basin and anti-cline strippings, into which divisions all such operations fall. Fig. 4, showing the crop stripping, is interesting in that it is also an illustration of a chain pillar left in early mining under the surface wash, which here was 40 ft. and more in thickness.

In the old days breasts were driven up until the roof caved in and then were abandoned. The exact width of the chain pillar remaining has not yet been determined, but it is at least 150 ft. Here the object is not to un-

cover all the coal but merely to remove sufficient of the clay and rock to make possible the mining of the coal from inside with minimum loss.

To do this it is impossible to drive chutes up in the old vein and therefore a gangway is driven in a small underlying vein from which chutes are driven up to a point opposite the lowest edge of the chain pillar, and rock holes are then driven through into this pillar.

3.46 CUBIC YARDS PER TON OF COAL RECOVERED

Fig. 6 is of a large basin stripping. This was operated for many years and the various stages of excavation are shown illustrating the characteristic methods of opening strippings of this kind. This operation was for the recovery of a virgin vein. The width of the pit was 300 ft. and its length 4800 ft.; the greatest depth of cover removed was 100 ft., and 3.46 cu.yd. of cover were excavated per ton of coal obtained. This stripping was in operation from 1900 to 1915, starting with an Oswego shovel and changing in 1909 to a 70-ton Bucyrus.

Fig. 7 illustrates an anticlinal stripping uncovering a worked-over area where, it is estimated, 60 to 70 per cent. of the coal remains. Upon this percentage depends the profitableness of the venture, as it has been undertaken

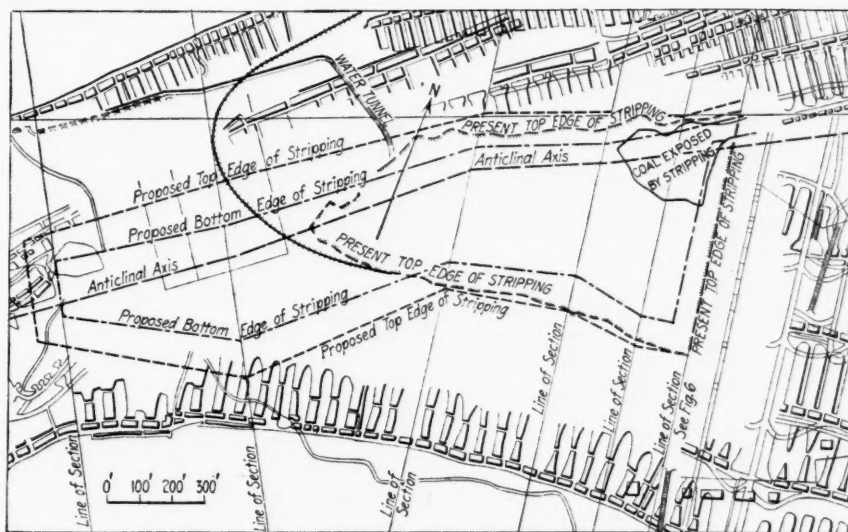


FIG. 8. PLAN OF THE STRIPPING SHOWN IN FIG. 7

primarily to form a final barrier against a fire that has been raging to the east of it for many years. The vein is 55 ft. thick and is on a 20-deg. pitch.

It has been robbed and rerothed and robbed again, but because of its thickness and the unhandy pitch, as well as the time of the mining, which dates back to early '50's, it is thought that not over 35 per cent. of the coal has been extracted. Fig. 8 shows a plan view of this stripping.

METHOD OF CALCULATING VOLUMES STRIPPED

Engineering methods begin with the location of a stripping and the preliminary estimates of its profitableness, and continue through the calculations of yardage removed in the various stages of excavation down to the final tabulation of results obtained. In laying out the stripping and making the periodic estimates of excavation, a high degree of standardization prevails throughout the anthracite region.

A base line is laid out parallel to the length of the stripping, with stakes at regular intervals of 20, 25 or

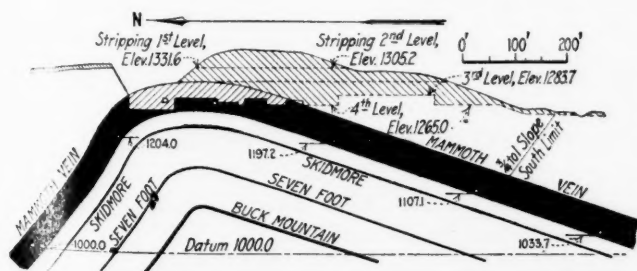


FIG. 7. STRIPPING TOP OF ANTICLINAL FOLD

27 ft. These are numbered in order, beginning with one. At each of these stakes lines are laid out at right angles to the base line across the width of the stripping and stakes set at 20- or 25-ft. intervals. Sometimes these are numbered, but the best way is to assign letters to them, beginning with A.

At any stage of the stripping operation these points can be readily relocated and levels run over them to ascertain the yardage removed. Cross-sections on each of the right-angle lines are plotted in the office on rolls of printed cross-section paper or tracing cloth. These plottings are invariably on a scale of 10 ft. to 1 in.

The use of 27-ft. intervals along the base line is worthy of note, as it is rapidly coming into practice. By this method the area in square feet of the cross-section on each right-angle line can be translated into cubic yards without any multiplication.

At the lateral limits of a stripping it is customary to place limit stakes, using large stakes painted red or white to give them special distinction and permanence.

CLASSIFICATION

The overburden in stripping operations is classified usually as rock or earth. This classification is purely for convenience in carrying out the contractual relations when the contractor has undertaken to remove earth at one price and rock at another. Where the price of removing

other earthy material, cemented gravel, and all coal, shale, slate, soft friable sandstone, and all other material in place except rock as hereafter defined; also stratified solid sandstone in layers of 8 in. or less in thickness when separated by stratified earth as above defined.

Rock, which shall include all solid sandstone in place in layers greater than 8 in. in thickness, whether separated by layers or earth as above defined or not, and all boulders containing more than 1 cu.yd.

The loose-rock classification is undesirable and quite properly the tendency is away from it.

The average rates paid for classified strippings have been quoted earlier in this paper. For unclassified work the average rate varies from 20c. to 25c. per cu.yd.

Prospecting by diamond drills is of the utmost importance, and the most successful stripping operations are those that have been most thoroughly laid out as the result of drilling. Holes are placed at proper intervals on cross-section lines sufficiently close to each other to insure, so far as possible, avoidance of error in the location and character of the vein or veins to be stripped. These cross-sections in badly distorted areas should often be as closely placed as 100 ft. apart. Prospecting by steam shovel is not to be recommended.

SPECIAL DEVICES, METHODS, ACCOUNTING SYSTEMS, ETC.

Many methods have been introduced for the keeping of a record of the progress of strippings, their cost, economy and other related data. Some of the anthracite

1916 Stripping Colliery																												
Monthly Statement showing Cost of Stripping																												
Month	Description of Cut	Average Depth of Cut			Surface Area Sq. Ft.	Excavation						Mining of Coal		No. Cars Loaded	Yield	Tons of Coal	Increase Per Ton of Coal	Total Cost of Stripping and Mining	Cost of Stripping per Ton			Cost of Mining per Ton			Total Cost of Mining & Stripping per Ton			Remarks
		Earth	Rock	Total		Earth Cu. Yds.	Cost	Rock Cu. Yds.	Cost	Total Cu. Yds.	Cost	Coal Cu. Yds.	Cost						A	B	C	A	B	C	A	B	C	
Year 1915	A																											
	B																											
	C																											
January	A																											
	B																											
	C																											
December	A																											
	B																											
	C																											
Year 1916	A																											
	B																											
	C																											
A - Stripping for Month — Coal Mined During Month B - Total Stripping to Date— Total Coal Mined to Date C - Completely Stripped and Completely Mined Section																												

FIG. 9. TABLE FOR TABULATING COSTS OF STRIPPING

rock and earth is the same, no classification is required and the rate established is known as an unclassified rate.

The definitions of rock and earth vary. As a rule, boulders of 1 cu.yd. and over are classified as rock, and all smaller as earth. Most variations in classifications occur at the gradation zone between earth and rock where the material to be excavated, though stratified and of the appearance of rock, is soft and of the consistency of earth. In some cases a third classification known as loose rock is employed, as is witnessed by the following definition:

Loose rock will include all stone and detached rock found in separate masses, containing not less than 3 cu.ft., nor more than 1 cu.yd.; also all slate, coal or other rock, soft or loose enough to be removed without blasting, although blasting may be resorted to; also stratified rock in layers of 8 in. thick and under, separated by strata of clay.

As a rule, however, rock and earth are the only classifications needed. One particularly complete definition of these two classifications is as follows:

Excavations shall be paid for under the following classifications:

Earth, which shall include clay, sand, gravel, loam, decomposed rock and slate, whether lying in place or not; stones or boulders containing less than 1 cu.yd., indurated clay or

companies have kept records in great detail for many years covering the actual cost of stripping work, and the results obtained in the greater efficiency of their stripping operations are strong evidence of the value of such thoroughness. In some instances the contractor's costs and profits are watched as closely as are those of the company.

Keeping a careful record of the actual results from each individual stripping cannot be too strongly urged. Fig. 9 is a reproduction of a sheet of this kind kept by one anthracite operator. The first columns can be passed over as merely giving tabulated data of value as reference.

The final columns, however, show at each successive stage of the stripping operation the unit costs, based on the coal tonnage recovered, or to be recovered, of results to date, results for a completed section and probable final results. As the stripping progresses, a glance is sufficient to show the exact financial standing of the particular operation covered.

Another special form which is of great labor-saving value to the engineers engaged in calculating the month-

ly yardage excavations is shown in Fig. 10. The stripping area is laid out in squares by parallel and right-angle lines. The illustration shows squares of 25 ft., but a similar chart could be worked up for any dimension. By means of this chart the intersection of any two lines can be found with the minimum effort and with field calculations eliminated.

YIELD AND WASTE

The yield from a stripping in per cent. of the total is naturally high. There are, however, certain losses such as the fuel loss; dump losses, where the coal is excavated by steam shovel; and various losses in digging and handling.

The fuel loss is, as a rule, the most important of these, as a large amount of coal must be used to supply fuel to the various shovels, locomotives, drills, etc., employed in stripping work, and in a majority of cases this coal is cut by the contractor from the uncovered areas of the vein. In one large stripping employing eight shovels the consumption per day ran about 50 tons, which means a total consumption of nearly 15,000 tons a year.

Another employing four shovels used 20 tons per day or about 6000 tons per year. This loss is never less than 2 per cent. of the total coal uncovered and runs over 5 per cent. at times. A steam shovel of 60-ton class will use 2 to 3 tons per day. A 12-ton locomotive uses about 1 ton, and churn drills and blacksmithing forges use about $\frac{1}{2}$ ton each.

In this connection some small economies can be effected, such as requiring the contractor to furnish well-constructed boxes or bins wherever coal is deposited or stored. These not only save much tonnage in the course of a year but also have a desirable moral effect on all concerned.

WHAT FUEL SHOULD BE USED IN STRIPPING

When fuel is not cut from the strippings, and always until coal is uncovered, fuel must be furnished from the colliery or from other strippings. This fuel problem is a rather important one and there is some difference of opinion as to whether or not all coal used in the operation of the stripping should be furnished from the colliery, rather than cut from the uncovered vein.

In cutting from the vein there is always waste, because only the best coal is taken. Moreover, the shovels and locomotives use none of the fine coal that is produced. In spite of this, it is impossible to figure the value of coal in the ground at anything except the profit that would be obtained by mining and preparing it for market, while against coal furnished from the colliery all the costs of handling it in the various stages of mining and preparation must be charged, and the comparison in cost is distinctly in favor of allowing the contractor to cut his own coal from the exposed vein.

The second loss or the dump loss applies only to vein areas previously worked over. There the loss occurs in the zone between pillars and old openings filled with gob and coal that has sloughed from the ribs of the pillars. At this point no satisfactory separation between rock and coal can be made with a steam shovel and the percentage of loss is high—perhaps 10 per cent. would not be an abnormal figure in some instances.

This loss can be reduced by various methods. All cars containing an appreciable percentage of coal can be sent

to the breaker and the separation made there, or a separate cleaning or separation plant can be erected for the handling of all cars too high in refuse to be handled economically at the breaker. Still another way is to dump all cars containing a specified percentage of refuse on a definite section of the dump and to employ laborers to pick the coal from the refuse by hand.

This method has been employed with success at various places. A single laborer has loaded as much as 2 tons a day by this method and if this average can be obtained the method is profitable. The dumps for the old Summit Hill Quarry mines, as mentioned earlier in this paper, are an example of the amount of coal that can be wasted in stripping dumps, as these dumps afterward took fire and burned with intense heat for many years. Evidently

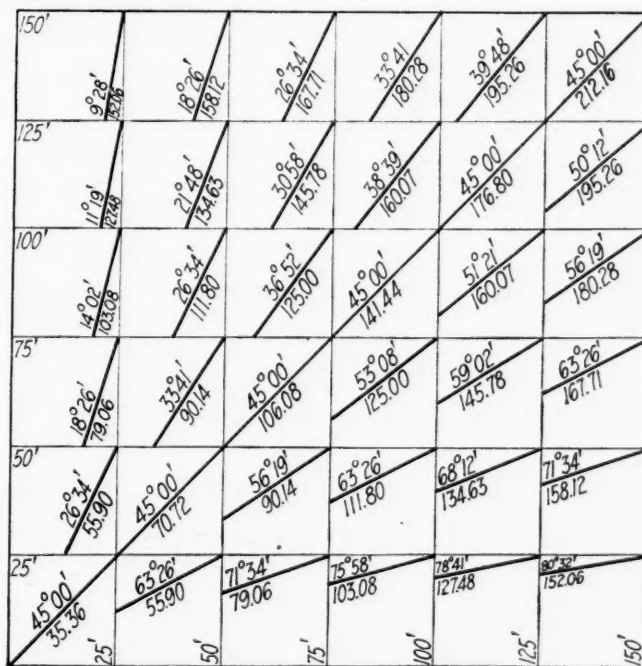


FIG. 10. SYSTEM FOR THE CALCULATION OF MONTHLY YARDAGE EXCAVATIONS

some progress has been made since that time in avoiding waste, but much yet remains to be done.

The other losses such as handling and blasting run as high as 5 per cent. at times, and the sum of all losses varies from 5 to 20 per cent., though the latter figure is unusual. Any reduction secured in any of these losses is true conservation.

MINING COAL FROM STRIPPINGS

The consensus of stripping experience is that it is more economical to mine coal from an uncovered area by loading by hand into cars, or by removing it with the aid of a steam shovel, than by the ordinary methods of inside mining. This is undoubtedly true as regards virgin-coal areas and is usually true as regards areas that have been worked over, though here the difference is not so marked.

When excavating coal in worked-over areas, it is necessary to excavate also all refuse and rock in old breasts, some of which might be left behind in chute mining. The recovery of coal from the strictly stripping area might also be less in a steam-shovel operation because of the various factors of waste that have been already discussed.

If, in addition, it is necessary to construct expensive planes to handle the product from the steam shovel, such

an operation may be the more expensive of the two, when all factors are considered. Ordinarily, however, the outside transportation cost will be found a little cheaper than the inside, unless the inside transportation can be handled without additional equipment, or men, especially if planes have been installed for the handling of the overburden.

It is a peculiar fact that loading into mine cars by hand in the open costs about the same per ton as coal recovered in excavation by steam shovel. At least this is true in worked-over areas. There are no data on similar work in virgin areas, but the difference in that case would probably be slightly in favor of the shovel. The objection to hand loading is, of course, its limited capacity, and its advantage is in the fact that the rock and slate are more completely separated from the coal.

In steam-shovel excavation of the coal, practice is about equally divided between contract and company work and circumstances to a large extent determine the procedure. If the cover has been removed by a contractor the company will usually have to make a complete change in track gage and equipment should it take over the work,

conditions especially favor the contractor. As a rule, contracts are not made for each individual operation, but instead, cover all work done by the company over a period of years.

The usual form of contract provides for payment by the cubic yard, for all material excavated, at certain definite rates. Some contracts have been made, however, that provide that the contractor shall be paid by the ton, delivered at a fixed point to the company, a sum supposed to cover all costs of removing cover and mining coal.

While such contracts are justified under certain conditions, they are not to be recommended. In their nature they are a gamble and their only virtue is that they sometimes secure the stripping of areas that would otherwise be left untouched.

Rates by the cubic yard are sometimes on a classified and sometimes on an unclassified basis. These terms have already been discussed. The unclassified rate is like the rate per ton of coal, somewhat of a gamble, and the classified rate is probably more satisfactory in the long run.

CONTRACT VERSUS COMPANY STRIPPINGS

For actual stripping of the overburden from coal deposits, the almost universal practice among coal companies is to let the work out on a contract basis. This has been the accepted practice since the earliest days of hand stripping. Indeed, this probably accounts partly for the fact that this is still the practice, as customs that once gain a foothold in conservative mining regions are likely to go unquestioned for long periods, and to spread from small beginnings until they become the dominating note in immense operations.

The contract system for stripping operations, however, has had other arguments than this in its favor. Coal operators have always been reluctant to have their attention distracted from straight coal mining by the injection of interests foreign thereto. Moreover, the margin of profit on coal recovered by the stripping method is so small, at the best, that it is practically essential before undertaking such work to know, within a cent or two per ton, just what the final cost will be and this is accomplished when by the contract system all risks of fluctuation in such stripping costs are assumed by the party of the other part.

Another argument is the usual one in favor of contract work, that such work is pushed more vigorously than company work, due probably to the fact that there is more individuality in the management of a small contracting company than in that of a large mining corporation. This argument does not apply to what is known as the individual operator, but another and more potent argument in his case is the high first cost of stripping equipment and his inability to keep it steadily employed.

Some, however, of the individual operators do maintain their own equipment and operate their own strippings, and many of these have succeeded in excavating overburden at a figure under the usual contract rate for the region. That the large companies could secure similar results is probably true, though to do so it would be necessary to devise some method of handling the work entirely outside of the regular organization of the coal producing company.

The question is an uncertain one, however, and the solution of the problem of securing decreased stripping

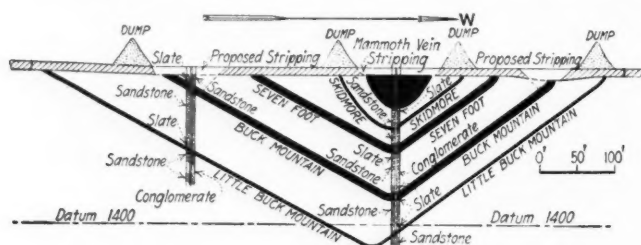


FIG. 11. DRAGLINE EXCAVATOR STRIPPING

and if the cover stripping is still in operation, as is frequently the case, such a division of operations would be very undesirable.

If possible, however, coal excavation in worked-over areas should be handled by the company and, if the output required will permit, the smallest size of shovel should be used. A cleaner product will be obtained with less waste in the dump and less handling of rock at the breaker. By the use of mine cars, also, a rehandling of the coal between the stripping and the breaker is often avoided with its attendant breakage and rehandling cost. The latter expense is a considerable item and has equaled 7c. a ton in certain cases. The minimum is never below 5c. per ton.

Written contracts between the company and the contractor are now nearly standard in essential form in spite of various local differences. It is, for instance, the universal practice for the company to furnish fuel and water though the mining of the one and the distribution of the other are generally required of the contractor.

Where planes are required the company also furnishes, in most instances, the power to operate them. Practically all contracts contain certain standard clauses that aim to prevent waste of coal by the contractors. Enforcement of such clauses, however, varies.

The contractor in assuming the risk of profit or loss in the operation is supposed to assure himself so far as possible of the local conditions to be encountered, and no claim for extras is ordinarily allowed for unforeseen difficulties met with.

On the other hand, no reduction in contract rates is asked by the company in operations where the natural

costs must probably be looked for elsewhere. It is becoming more and more essential to the larger operator in the anthracite regions to consider carefully some means of meeting the increasing cost of producing coal. He would be helped in securing this if he could contrive in some way to strip the remaining available areas over a greater area and to a greater depth than is economical under present practice. If this increasing demand for larger and deeper strippings cannot be met by the contractor, then the operator himself must assume the burden.

POSSIBLE IMPROVEMENT IN PRACTICE

Past history of stripping operations, as recited briefly at the beginning of this paper, has shown that in spite of large increases in the wages of labor and in the cost of materials the cost of stripping has been reduced by improvements in methods and the employment of adequate labor-saving equipment. It can be confidently expected that the future of anthracite stripping will repeat this history.

Already at one operation in the region this has occurred. At this stripping the problem was met by the installation, at a cost of over \$30,000, of one of the large drag-line excavators that have been so successfully operated in Middle Western coal strippings and in ship-canal excavations. Fig. 11 is a cross-section showing the measures stripped at this particular operation. Briefly, this machine is about 255 tons in weight and is of the revolving type. It is electrically operated through a complete control system which protects the motors from disaster due to overloading or sudden strain of any kind. The machine revolves in a complete circle with a radius of 125 ft.

Where the ground is at all regular this machine can be readily moved along when a cut is finished, by casting the bucket to a point in advance and with the anchorage thus secured dragging the entire apparatus over wooden rollers. For uneven ground, or ground broken up by crop falls, the machine can be equipped as a shovel and results nearly as satisfactory secured.

TRANSPORTING THE OVERBURDEN IS EXPENSIVE

Wherever it is possible to cast the excavated material to one side, instead of loading it into cars, labor is largely dispensed with. The labor item in ordinary strippings is probably 70 per cent. of the total cost of removing the overburden, but in such an operation as described this percentage is reduced to about 50 per cent.

From the results obtained to date it is believed that present stripping costs can be reduced by these advanced methods at least 10c. per cu.yd., allowing amply for interest and depreciation items. The cost for power has been proved to be only 1c. per yd. and the first cost of the equipment is little greater than for an ordinary 70-ton shovel operation requiring a full complement of locomotives, dump-cars, rails, etc.

The principal item of cost is the moving of so large a machine from one stripping operation to another, or to and from the railroad. If the distance is great or if hills intervene, the machine must be taken down and carried piecemeal to its new location and there set up. This represents no insuperable difficulty, however, and it is probable that the number of these machines in the anthracite region will gradually increase.

It is reported that in Kansas ratios of 10 cu.yd. of cover to 1 ton of coal have been handled profitably by means of this equipment. Many areas remain to be stripped in the anthracite region, for the end of stripping operations is not yet in sight, and if costs can be reduced to the extent outlined above there will be many areas not now considered as stripping propositions, that will be the big operations of the future.

Various methods now employed in other stripping and excavating operations could perhaps be used to advantage in the anthracite region. Space, however, permits only the briefest mention of two of these.

Geared locomotives are practically unknown in the anthracite region. There is a record of a stripping operation on an area of only 20 acres, where by the use of these locomotives a difference in elevation of 300 ft. between the bottom of the stripping and the top of the dump was overcome without passing outside the lines of the property.

Another possible improvement would be the use of hydraulicking methods. Lack of water and a scarcity of areas on which to deposit and settle the refuse render this method in most sections of the region out of the question.

Very low costs have been secured, however, in the West by this method and areas where it would prove feasible might be discovered. Where the refuse or spoil could be flushed into mine openings to support the surface a double value would be obtained.



From "Retail Coalman."

WHO IS TO BLAME?

The general public are commencing to understand that the responsibility for the fuel scarcity and for the present high coal prices rests largely on the railroads that cannot furnish adequate transportation facilities.

Who's Who In Coal Mining

J. W. Bischoff

The Davis Colliery Co. down in West Virginia is one of the most progressive coal corporations in a state famous for the efficiency of its mining organizations. One of the chief cogs in the machinery of this company is J. W. Bischoff, general superintendent of mines. A young man, just turned 40, he has accomplished much that is worth while in the business of getting out coal.

Mr. Bischoff was born at Westernport, Md., in 1877. At the age of five his parents moved to Elk Garden, W. Va., at which place the late ex-Senator Henry C. Davis and his associates were just beginning the development of the Elk Garden mines in the Pittsburgh seam of coal. The elder Bischoff was then employed as a miner.

Young J. W. attended school in the winter and worked at different "jobs" in the mines during the summer months. By thus working a part of the year he succeeded



J. W. BISCHOFF

General superintendent of mines for the Davis Colliery Co. in West Virginia

in supplying himself with sufficient money to take up a course in mining at the Ohio State University, from which institution he graduated with the degree of E. M. in 1899.

Just as soon as young Bischoff had his sheepskin safely tucked under his arm, he hiked back to West Virginia and started work on the engineering corps of the Davis Coal & Coke Co. at Thomas. Soon the young engineer felt that he must conquer new worlds, and he adopted a migratory life, which took him to Pennsylvania, southern West Virginia, Kentucky and Montana; all the time as superintendent or engineer of mines.

Nine years of this experience cured him of the *Wanderlust*, and he was willing to listen to the call of his native hills, returning to West Virginia in 1908 as chief engineer of the Davis interests. Five years in this work brought him an advance to the position of general superintendent,

which place he now occupies. The romance of it all—and there is romance in all our lives—is that Mr. Bischoff is now boss of all the mines in which he started work as a trapper-boy more than 30 years ago. His life points out and affirms the great opportunities that exist here in America for the young man who has energy and a determination to advance, irrespective of early disadvantages.

Mr. Bischoff devotes practically all his time to his home and his mining work. He is active, however, in the councils of the West Virginia Coal Mining Institute and is vice president of that organization.

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An Appeal to American Engineers

The following letter, addressed to the members of the engineering profession in the United States, was signed by 76 of America's most prominent engineers. It is certainly deserving of attention.

The families of many professional men in Great Britain are experiencing privation such as they have never before been called upon to face. This is true not only as regards families of those at the front, but also as regards families of many who are excused from active service because of age or physical disability, but who find themselves in need owing to the fact that they no longer are able to earn an income in the practice of their professions. For example, an architect in England today has practically no possibility of professional employment, except in governmental work, as the construction of buildings, except those required for Government purposes or specifically authorized by the Government, is not permitted.

To relieve the resulting hardships and distress, the Professional Classes War Relief Council, Inc., was organized in Great Britain shortly after the outbreak of the war. Maj. Leonard Darwin, a son of the great naturalist, is chairman of the Council. Jerrard Grant Allen is now in America representing the Council, and independent investigation has confirmed his statements in respect not only of the need which exists, but also in respect of the organization and methods of the War Relief Council.

J. Pierpont Morgan has loaned to the Council his house in Prince's Gate for use as a maternity hospital. Births in this institution last year numbered approximately 300. At the present time the Council is disbursing about \$5000 a week, and the administrative expense, which is limited to compensation of subordinate employees, amounts to less than 2 per cent. of the money distributed. The Council directs its activities largely along lines which provide relief by finding temporary employment for those whose accustomed way of earning a living is cut off, but in many cases pecuniary help is necessary.

The undersigned appeal to American engineers to demonstrate their sympathy by contributing to this most worthy object. Let us help in this crisis as we should hope our professional brethren in Great Britain would help us were their position and ours reversed.

It is hoped that practically every American engineer will contribute at least \$5, and contributions of this amount will be most welcome, as it is desirable that the engineering profession in America be represented by the largest possible number of contributors. Larger amounts also will be highly appreciated, and we ask you to give as liberally as you can.

Contributions may be forwarded to Lewis B. Stillwell, treasurer, care the Farmers Loan and Trust Co., 475 Fifth Ave., New York City.

COMING MEETINGS

The New England Coal Dealers' Association will hold its annual meeting Mar. 28 and 29, at Boston, Mass.

American Society of Mechanical Engineers will hold its spring meeting May 21-24 at Cincinnati, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Chemical Society will hold its spring meeting week of Apr. 9 at Kansas City, Mo. Secretary, Charles L. Parsons, Washington, D. C.

Mine Inspectors' Institute of the United States of America will hold its tenth annual meeting July 10 at Indianapolis, Ind. Secretary, J. W. Paul, Empire Building, Pittsburgh, Penn.

The Labor Situation

General Labor Review

The troubles with the breaker boys in the northern anthracite region at the mines of the Delaware, Lackawanna & Western R.R., Coal Department, have been duplicated in the Panther Creek Valley, at the mines of the Lehigh Coal and Navigation Co., which on Mar. 5 had nearly 100 breaker boys on strike at No. 8 colliery. The platform men at the Nesquehoning colliery also wanted their wage scale raised from 22c. to 30c. an hour and, refusing to work, laid half the colliery idle. But all these troubles are now at least temporarily assuaged.

There has also been some agitation against working on Saturday afternoons. The referendum recently made committed the mine workers definitely to work the full six days every week instead of a longer period for five days and a shorter period for Saturday, as proposed by the company. But the mine workers are not satisfied. By violating their agreement they had secured Saturday afternoon for their own without any compensatingly long working time for the other five days.

The referendum merely committed them to the contract, the vote only offering them a chance to decide how they would work the agreed number of hours. The radicals do not want to work as long as they have agreed, and however the referendum might have run they would have been dissatisfied. They probably thought that after a little while matters would slide back into those grooves for which the minds of all the workmen were prepared by long use, and that then the mines would again work only a half-day on Saturdays.

Union Insists That Contract Be Obeyed

The officers of the United Mine Workers of District No. 7 on Mar. 8 declared the strikes must cease and grievances must be referred to the district officials for settlement, either through conference with the officials of the Lehigh Coal and Navigation Co. or the conciliation board. It does not pay workingmen to be continually laid idle so that now the breaker boys and now the platform men may seek to get a raise in wages. The body of workmen thus become the dupes of the individuals or small groups of individuals that believe they would like more pay than the contract calls for.

The Industrial Workers of the World have been circulating notices calling a meeting at Dupont, near Pittston. Before the hour of assembly the sheriff notified the proprietor of the hall that the meeting must not be held. He threatened that he would use force, if necessary, to prevent a meeting. As a result the I. W. W. leaders called the meeting off.

On Mar. 5, 1000 union men at the Franklin colliery of the Lehigh Valley Coal Co., near Wilkes-Barre, Penn., declared a button strike. These strikes have been less frequent of late, Wilkes-Barre not having had one for several months. There were only six men that the union tried to discipline, but the whole colliery was tied up for that end. At Shamokin, on Mar. 8, the machinists, carpenters and other monthly men of the Carbon Run Coal Co. went on strike to compel the company to pay them for overtime. As a result 200 employees were idle.

Stineman Firms Abolish Standard Weight

In central Pennsylvania, the Stineman Coal and Coke Co. and the Stineman Coal Mining Co. have decided to abolish the standard weight beginning with Mar. 6. The Stineman concerns paid for no coal on the mine car in excess of 3500 lb. They will from now on pay for the full weight as loaded. The action was taken voluntarily by the company officials.

The Portage operators still contend that they cannot grant the abolition of the standard weight. The mines of the Stineman interests are at South Fork, in Cambria County, on the same line, and only a few miles away from the Portage operations, and it is thought that the action of the Stineman concerns will assist in the settlement of the Portage difficulty.

The unionized part of the Pittsburgh region has had some difficulty as to the extension of the use of the electric cap lamp and permissible explosives. The operators claim that they can install them where they please. The miners say the agreement provides only for the use of either of these safety provisions at places where they had already been installed when the agreement of Apr. 1, 1916, was signed.

At the Florence mine of the Youghiogheny Coal Co., the miners have been on strike, asking for 75c. instead of 65c. per car of coal. The company declared that it was paying the regular scale of wages of the district and could not pay any more. The State Mediation Board managed to induce the men to go back to work. There were only about 75 men idle.

The special convention of District No. 2, including all central Pennsylvania, is called to meet Monday, Mar. 26.

The McDonaughton shaft of the Brothers Valley Coal Co., in Somerset County, had a three days' strike last week involving 250 men. There was much dissatisfaction in reference to the company's interpretation of the new wage increase that has been generally granted at all the mines in Somerset County, but ultimately the men went back to work.

In the Pittsburgh district, but ununionized, are the mines around Glassmere, Hites and Creighton, near Tarentum, in Allegheny County. These operations, like those up the Kiskiminetas River, have been almost idle for nearly a year because the companies operating them will not recognize the union. The Cornell Coal Co., of Glassmere, has filed injunction proceedings against Local No. 428, declaring that the union miners intimidate and prevent other miners from working in the Cornell mine.

Ohio Miners Still Urge "Voluntary" Increase

The Ohio mine workers are engaged, as one man recently put it, in trying to "compel" the operators to give them a "voluntary increase" in wages. The Ohio operators seem not unwilling, but they do not want to lead the way. They are waiting on the Pittsburgh region, and it is to be hoped that the operators there are not so tied up with contracts which cannot be changed that they will be obliged to refuse the mine workers a change in wage which living conditions make advisable. The Ohio operators rightly say that western Pennsylvania, Illinois and Indiana have still to be heard from. J. H. Pritchard, chief deputy and safety commissioner of the Industrial Commission of Ohio, says that the mine workers are going to stand by their agreement till its time expires.

The eastern Ohio mine workers have decided to locate their \$50,000 Miners' Temple at Bridgeport, a town opposite Wheeling, W. Va. Bellaire wanted the building and offered to subscribe \$10,000 if that town were selected for its site. The nineteenth annual convention of the eastern Ohio miners, representing about 15,000 men, met in the Trades and Labor Assembly Hall in Wheeling, Tuesday, Mar. 13. It was expected that some constitutional changes would be made, among others the transference of the strip-pit workings from District No. 5 to District No. 4, to date from Apr. 1.

New Kanawha Agreement Must Now Be Made

The Kanawha labor agreement, approved by the miners July 15, 1914, and running till Apr. 30, 1917, will be found in full in "Coal Age" of Aug. 1, 1914, Vol. 6, pp. 188-190. The union has now to arrange for another scale. The times are not propitious. The operator knows that present prices will not last and that he cannot afford to pay in perpetuity wages which at the present time seem quite within the bounds of reason. He is not sure that a year from now the increase he will give will be met by competing fields. He is therefore disposed to be cautious. The mine workers also must remember that the operator is not alone in dreading rises which shut him out of the market, for the happiness of the mine worker rests on continued business.

The demands are as follows: (1) All coal weighed and paid for on a mine-run basis of 2000 lb. (2) An 8-hour day for all classes of labor in and around the mines. (3) Full and complete recognition of the United Mine Workers of America. (4) A flat increase of 10c. a ton on all pick- and machine-mining tonnage rates. (5) An equivalent percentage increase on all yardage, deadwork and room turning. (6) The same day-wage scale as paid in the central competitive field. (7) Readjustment of the rules governing working conditions and the elimination of existing inequalities. (8) A scale to last for a period of one year.

At the Detwold mine of the Maryland Coal Co. 150 miners have gone on strike in sympathy with their mine foreman, whom the company discharged.

Editorials

Threescore Years and Seventeen

Barring accidents, the miner lives to a good old age and is usually hearty up to the end. Samuel Whitson, of Wilkes-Barre, Penn., is an instance of such men. He was born 77 years ago, that is, in 1840, before telegraphs were invented; the year when Van Buren was elected to replace W. H. Harrison as president of the United States. He entered the mines 16 years later, 1856, the year before the celebrated Dred Scott decision when, as will be remembered, James Buchanan was elected to fill the presidential chair.

Whitson, therefore, links up the prebellum days with the present. Though white-haired and bent with age, he still cuts coal and loads it. He has seldom been ill, and coughs and colds have never troubled him. Coal mining is dangerous, and Whitson might easily have been one of the unfortunate men crushed by a rock or a mine car. But though he has worked with and near men who were mangled, fortunately he himself has escaped. No proof could be based on the experience of one or a hundred men, but Samuel Whitson is a striking illustration of a fact proved by ample statistics—that the life of a coal hewer is a healthful one.

Collective Coal Buying

The old saying of "a prince or a pauper" finds no truer application than in the coal industry. The problem of selling coal at a profitable figure is almost, if not quite, as fine a science as that of producing it at a minimum price. But the past season has been an exception to this rule. Operating interests have never before been in such thorough control of the market over such a sustained period as has been the case since last fall, and prices have automatically taken care of themselves.

An inevitable result of this will be to sharpen the wits of the buyers. Consuming interests have been hard pressed to get sufficient supplies to keep going during the past winter, while the all too frequent abrogation of contracts and exaction of exorbitant prices will stimulate an aggressive interest in this question. The coal men will do well to be prepared to meet some radical readjustments along this line.

One of the first and most promising fields for investigation by the consuming interests will undoubtedly be in the matter of collective buying. The advantages of large scale purchasing, conducted under the supervision of a trained expert, have been too well demonstrated not to come up for serious consideration in this instance, and more particularly is this true of coal, about which the average layman has only the vaguest ideas. Of all the raw products there is probably none subject to so many vagaries as coal; nor is there any in which it would be possible to effect such great economies in consumption by the intelligent study of the methods of buying and using.

Organizations of this kind will probably take the form of a fuel supply company in which all those participating

will subscribe for stock according to their consumption. Purchases by such a concern can obviously be conducted on the most advantageous terms and will receive the greatest consideration in times of stress, such as has marked the past winter. The plan may even expand to include systems for storing large tonnages and provide for a thorough chemical investigation of different coals and purchases on the heat-unit basis.

One special advantage would be the balancing and averaging up of requirements. Thus, where one of the participating concerns might find itself compelled to call for a substantial extra tonnage, this could be made up by small reductions in tonnages allotted to the other companies which they could readily spare for the time being; or the requirements of one consumer might be reduced through some unforeseen contingency, and this extra tonnage could be absorbed by the remaining companies.

Buying Coal on Specifications

The question of buying coal on a heat-unit basis crops up with a persistence that will not be denied, as indicated by the recent series of articles on this subject in *Coal Age*. Preponderance of opinion is undoubtedly adverse to the adoption of this system, but broad-minded men will remember that this has invariably been the case with all innovations, including the steam engine, the telephone, the incandescent lamp and, in more modern times, the wireless and the aeroplane. It is therefore an issue that the coal industry may be eventually called upon to meet.

It will also be conceded that the most aggressive opposition to the scheme is encountered from the coal men themselves; and since the operators are the most powerful factor in fixing upon the basis of negotiations in the sale of coal, it can be readily understood why so little progress has been made in buying on specifications.

It must be further conceded that the opposition of the operating interests is in most instances sincere. As was pointed out in the recent series of articles mentioned, the methods adopted for determining the heat value of any specific tonnage must be thorough in the extreme. The work should never be attempted except when in the hands of trained experts who are of irreproachable character. It is more than likely that the opposing producers who have had experience with sales on this basis have been victims of irresponsible or inexperienced samplers and chemists. Experiences of this kind have undoubtedly created a bitter opposition to the specification buying system that the sponsors for it will find difficult to overcome.

A potent influence on the adoption of this system of buying is the notable tendency for big consolidations among the steam-consuming interests. Under these conditions the fuel bill assumes more importance and justifies a greater expenditure and more exhaustive investigation. The adoption of the central power plant idea and the elimination of the smaller steam units are also important movements in this direction. As an example of

this latter we may take the Interborough Rapid Transit Co. in New York City. Prior to the electrification of the elevated railroads, the motive power was derived from small steam locomotives. Obviously, variations in the grade of coal were scarcely perceptible in these smaller units, but with the completion of the large central power plant the fuel problem came up for such a critical study that a chemical laboratory for the examination of the coal was found to be necessary as a part of the operation of this plant.

Progressive coal operators will want to keep up with the practice in this connection. The tendency among large consumers to adopt the heat-unit method of buying is too well defined to be ignored, and the coal seller showing a disposition to face the issue squarely will receive preferential consideration.

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Abrogation of Contracts

One of the inevitable consequences of the extraordinary market conditions that prevailed during the past winter has been the numerous reports of instances where operators have failed to meet their contract obligations. It will be impossible to ever estimate to what degree this abrogation of contract agreements was legitimate. Some operators have undoubtedly sold tonnage in the open market that should have been applied on their regular contracts, while others have also undoubtedly made sincere efforts to meet their obligations and, in a great many instances, sustained direct financial losses in doing so.

But disregarding the various merits or demerits of the case, it is interesting to review the extent to which it has spread. Rumors and gossip on the subject have become so general that the situation is confusing, and some actual statistics bearing on this, which have just come to hand, are of special interest. These statistics were compiled by a representative of 35 large steam consumers who has made an exhaustive study of the subject. Having access to all the records of the companies involved, the figures given may be accepted as authentic.

This investigator found that of the 35 companies involved there were only five whose contracts had been completely filled. Of the remainder, six had been confining their purchases to the open market, four had stocked sufficient coal in the summer to carry them through up to the time of the investigation, and the remaining twenty had contracts which had not been filled. The coal was being bought mostly through jobbers, some twenty-five of the companies negotiating their purchases in this way, while seven were buying direct from the mines, and three locally. The investigator found that the concerns dealing directly with the mines generally received the best service, their requirements having been met within 75 per cent., at least. The aggregate consumption of all the companies investigated amounted to about 300,000 tons per annum.

The lessons to be drawn from these figures speak for themselves. Under the complete demoralization of transportation that developed during the winter, the record of the operating interests in meeting at least 75 per cent. of their obligations seems fair. It must be remembered that while an operator may enter into an agreement to furnish a certain tonnage in all good faith, he is subject to the irregularities of transportation in meeting these obligations.

It would seem the only equitable arrangement that can be made in this connection is the clause now embodied in

some contracts whereby not only the tonnage the operator agrees to furnish is specified, but also what percentage of his total output this represents. As an example, where an operator having mines with a gross capacity of 100,000 tons per month enters into a contract to furnish a concern with 1000 tons per month, it would be specified in the contract that the purchaser is buying not only 1000 tons of coal per month, but 1 per cent. of the producer's output irrespective of what it might be. Thus when the operator had been able to produce say only 75,000 tons in a certain month, this particular buyer would be entitled to only $\frac{75}{100}$ of 1 per cent. of the production, or 750 tons.

A great deal of bitterness has developed between coal buyers and sellers during the past season, due largely to the loose and irregular manner in which contracts are drawn up; and it is to be hoped that all concerned will take aggressive measures to see that this does not occur again on the new contracts now coming up.

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Geological Survey Topographic Maps

The topographic sheets of the United States Geological Survey are perhaps too well known to coal engineers to require any description. Their general excellence and accuracy are unexcelled by any other maps, no matter how pretentious they may be, not only in this country but in the world; and yet it often happens that when an engineer goes into some district to inspect the local mines or properties he finds to his amazement that the residents themselves have never before seen the topographic sheets which he brings with him. Obviously here is a fruitful field for publicity.

The work of mapping the United States on the scheme outlined by the topographic survey began 40 years ago; and, by a strange coincidence, 40 per cent. of the country is now covered by the purely topographic maps. In addition to this some very elaborate maps of our foreign possessions have been completed as well as extensive geological studies of various districts.

Few people perhaps have even a faint idea of the tremendous magnitude of this work. During the last 30 years, the department has expended \$15,000,000 on geologic and topographic surveys in this country. The expenditures last year amounted to \$800,000, excluding the cost of engraving the copper plates and printing the maps in the multitudinous colors. And it should be remembered that the results of this work are all available at practically the cost of the paper and printing; the heavy initial expenses of the field surveys, engraving, and preparing for color printing are disregarded entirely in fixing the selling prices. The cost of the field survey alone for each of these maps will run from \$5000 to \$6000.

There are now some 2500 different maps, and the Geological Survey keeps about 4,600,000 copies of these for sale. The surveys have of course been conducted in all the states of the Union, and in order to facilitate the selection of the particular sheets in which anyone may be interested, index maps of each state have been prepared showing the areas mapped and the limit and names of the different sheets. Copies of these index maps may be had free on application to the Director, the United States Geological Survey, Washington, D. C. The standard topographic map retails at 10c. per sheet, the geologic folios at 25c. each, and discounts of 40 per cent. are allowed on all orders amounting to \$5 or more.

The lower left-hand picture shows the danger involved in shooting in the face of a crosscut without notifying the man in the next room who may be shoveling in the same incompleting airway. The size of the pillar yet to be cut is not known and may be less than thought, and the result of the bad judgment and failure to give due warning may be a fatal accident. The same is true where two rooms driven without sights run too close to each other, or two rooms or headings are driving to meet on end, or a room is driven through to a return airway.

The lower right-hand picture illustrates the danger of running along the cars on a moving trip. Jimmy Randall had one foot in each car when the motor took up slack and dropped him to the track. In 1916, according to the United States Bureau of Mines, 147 persons lost their lives by being run over by a car or motor in the coal mines. Probably many of these were trying to walk along moving trips, but the report, though excellently detailed, fails to give that information. In addition, 42 persons lost their lives by falling from trips in coal mines.

The illustrations are the first of the cartoon character issued by the Mining Section of the National Safety Council and the society much desires to know what the coal-mining industry thinks of the new departure. Members may send expressions of approval or disapproval to W. H. Campbell, general manager, National Safety Council, Continental and Commercial Bank Building, Chicago, Ill.

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Precautions Taken at Canadian Collieries Co.'s Mines

BY RALPH W. MAYER*

At the mines of the Canadian Collieries Co. (Dunsmuir, Ltd.) shotfirers fire all shots, using a magneto for that purpose. These shotfirers make their rounds twice a day—a complete trip in the morning and going over the route a second time, as soon as the first is completed. They light all shots which they may find ready when making either trip.

When a working place is entered by the shotfirer, he examines the shothole and sees that it is clean and properly placed. He is also required to notice whether the coal is being sent out free of all unnecessary impurity. He regulates the amount of explosive used and sees that the hole is properly tamped with clay. Only wood tamping bars are allowed to be used.

The shotfirer does not allow explosives to be forced into a hole too small for their reception and sees that the miner keeps his lamp 5 ft. away from his powder on the intake side and not closer than 4 ft. in any other direction. He also watches to see that the miner does not keep his open light on his head when making up his powder.

When firing a shot he examines all points within a radius of 25 yd. to see that there are no deposits of coal dust. He then connects up his lead wires to the wires or legs of the detonator and stretches them out to a place of safety. Here he connects the lead wires to the posts of his magneto and turns the crank firing the shot.

He loads and fires each shot separately, if there is more than one in a room, examining the working place before loading the second shot and also before allowing the miner

to return to work. If the shot misses fire, he waits 15 min. before returning to the room, and even then he examines the place before allowing any one else to enter. If a shot misses, it is not drilled out but another hole is drilled not less than 2 ft. from it.

The shotfirer carries the magneto slung over his shoulder on a strap, so that he has it with him all the time, which prevents anyone else from using it and firing shots. If the places are dry and dusty, he has to see that they are watered until wet at all points within 20 yd. of the shot. The rule is more stringent on haulage roads. These have to be wetted for a distance of 40 yd. from the shot. If the safety lamp shows a blue cap, the shotfirer does not fire the shots until everyone is out of the mine. The same applies to rock work.

GUARDING THE DANGEROUS POWDER CANISTER

The miners carry their powder into the workings in a metal or sheet-iron canister holding not over 4 lb. of explosive. They are not allowed to have more than one canister apiece in the mine, nor more than 4 lb. of powder in it. Only permissible explosives are used. No brand of powder can be used unless permission is granted by the Minister of Mines, and then only after a sample has been submitted to him for examination and test.

The canisters have tight-fitting tops and are carried by a rope slung over the miner's shoulder. Each canister has one of the miner's regular coal-car loading checks on it. When his shift is ended, he drops the empty cans down a chute into the powder house through a small trap-door.

The powderman puts 4 lb. of powder in each canister and charges the item against the check number which he finds on the can. When the miner goes to work he calls his check number and receives his powder canister filled. Originally each miner had his own rack in a room which was always open and to which all the men had access. They went to these racks and took their own canisters.

This was not so satisfactory as the present method, in which the powderman hands out the canisters to their owners through an open wicket. The main powder magazine is a safe distance away from this powder-distributing house, in which only a small amount of powder is kept, and where the powder is thawed out if necessary before it is delivered to the miners. They receive their detonators at another building. The miners keep their detonators in cases, and wooden skewers are used in making the holes by which the detonator is inserted into the cartridge.

When the miner needs clay for tamping it is brought from the parting to his rooms in a gunny sack by the driver just as timbers are delivered.

The miners carry their own powder and detonators into the mine, walking into the mine but riding out. No holes exceeding 6 ft. in length are ever drilled and the shot-holes are usually stemmed to the mouth with clay. As both the miner and shotfirer are present when the shot is fired, and the shotfirer is not hurried, blownout shots are practically unknown.

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Westmoreland County Coal Operators Aid Boy Scouts—Three of the large coal operators in Westmoreland County, Pennsylvania—the Westmoreland Coal Co., the Penn Gas Coal Co. and the Manor Gas Coal Co.—have combined to contribute \$200 a year for three years toward the Boy Scout movement in the county. It is expected that \$20,000 will be raised.

*Roslyn, Wash.

Making a Fanhouse Beautiful

The desert around the fanhouse of the Utah Fuel Co., at Somerset, Colo., is by no means lacking in æsthetic value. To an Easterner, the beauty of the Western country, with its tufts of vegetation springing up among the rocks, is a surprise. Presenting an uncomely appearance in a photograph or illustration, it is found in reality to be by no means forbidding. The blended colors of rock and brush fully make up for that unkemptness of appearance that impresses one in a black-and-white reproduction.

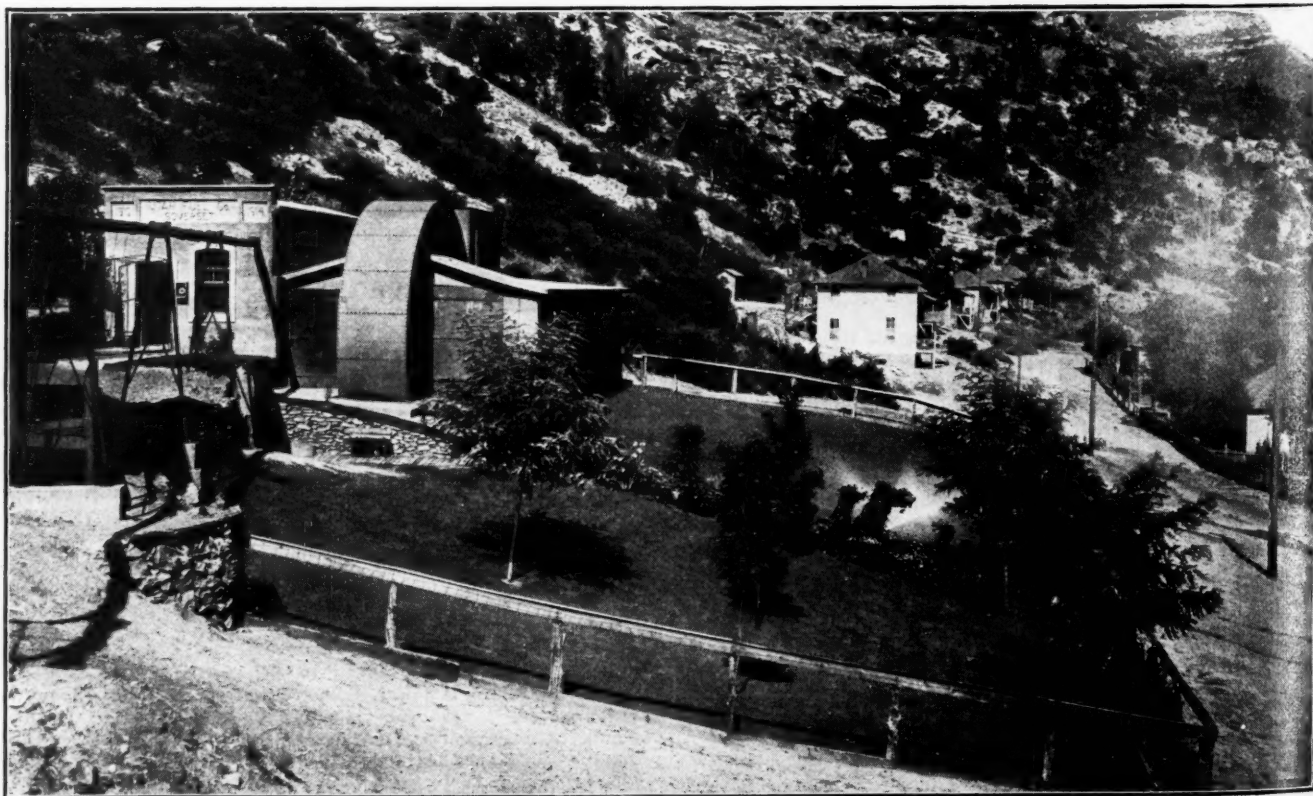
But still there is a savage strength about the Western landscape, and its appearance being so unlike the cultivated and homelike East from which many Westerners

have sprung, a patch of green grass and vegetation is welcomed as if it were a vision of the old home. Thus it is that the little grass plot, with its trees and the more substantial fanhouse on the left, makes its silent appeal to the residents of Somerset.

Being a bit of orderliness and cultivation on the mountain side, the little park adds to the joy-of-living in the village and gives the one-armed man who attends the fanhouse something well worth the doing in the hours of attendance—not a little matter to one who finds the time otherwise hangs heavily. Many a fanhouse could be made a place of beauty without much work. Minutes only are spent at home for hours spent at our work, so why not beautify one as much as the other?



TYPICAL FANHOUSE ON A WILD WESTERN HILL SLOPE



FANHOUSE AFTER RECONSTRUCTION, WITH A PRETTY LITTLE PARK AS A FOREGROUND

Discussion by Readers

Making Up Cartridges in Mines

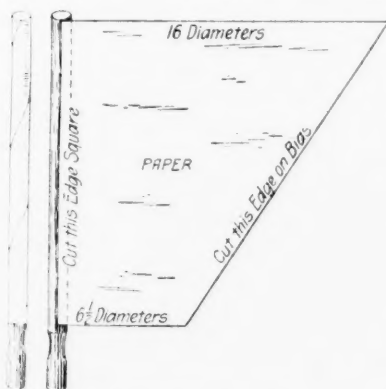
Letter No. 1—I was much interested in reading the letter of W. L. Morgan, *Coal Age*, Jan. 27, p. 203, in which he describes several accidents that occurred through miners filling their cartridges in the mine. He speaks of two cases where the miner poured the powder into his cap, from which he filled the cartridge.

In this connection, let me say that I have known miners to make up a cartridge that was the whole length of a newspaper and was so weak when filled that it had to be carried with two hands to the hole where it was to be used. Such a cartridge will often stick in the hole.

Instead of drilling a new hole, the miner will then throw a little tamping into the mouth of the hole and fire the charge. The result is that there is invariably produced a blownout shot. He is fortunate, indeed, if the flame of the shot does not reach and ignite the balance of powder left in his keg.

With the aid of a small cartridge case that can be easily carried into the mine, it is possible to make up one's cartridges at home, in the light of day, instead of in the mine with the necessary artificial light. Moreover, there will be no surplus powder kept in the mine.

A better quality of paper should be used than newspaper in making up the cartridges. Wrapping paper is



ROLLING THE PAPER

generally stronger and better adapted for this purpose. Let me suggest that the paper should be cut in the form shown in the accompanying figure and wrapped about a stick to form a tube for holding the powder. The length of the stick should be a few inches longer

than the desired length of the cartridge and have a diameter $\frac{1}{4}$ or $\frac{3}{8}$ in. less than the width of the cutting bit of the drill used in boring the hole.

As shown in the figure, one end of the paper should be cut square and the other on the bias. When this paper is wrapped around the stick, starting with the square edge and finishing with the biased edge, it will have the appearance shown on the left of the figure. This has the advantage of enabling the wrapper to be made secure after filling the paper tube with powder.

One advantage in the requirement that cartridges should be made up at home is the fact that the danger of lighting a fire that has started at the working face, in a room or entry, will be much less than if powder is kept in the mine, and it will not be necessary for the men engaged in the work to take the precautions that would otherwise be required.

This matter is worthy of discussion, and I hope to hear from men who have followed the practice of making up their cartridges at home. Their experience and conclusions in respect to the increased safety in the mine, as compared with the trouble of carrying the cartridge case to and from their work, will be of interest.

Sturgeon, Penn.

JAMES POTTS.

Textbooks in Examination

Letter No. 19—I have followed with great interest the discussion of the use of textbooks in examination and, while I do not feel competent to express an opinion on this question, it seems to me that some means should be adopted that would encourage many capable young men in our mining towns to devote more of their time to the study of the theory and principles of mining.

The real trouble is generally to be found in the fact that many good miners do not want their sons to follow their calling. The boys are sent, perhaps, to school and receive some education, much of which is quickly forgotten, because it does not bear directly on a fixed aim in life. As a result, many young men are found idling away their time about camp, seeking odd jobs.

Many of these young men eventually drift into the mine. Later, they have a desire to secure a certificate. In the shortest time possible such a one attempts to prepare himself for the examination and, failing to pass, says it was because he could not remember the formulas and constants he had tried to learn.

NECESSITY FOR CONTINUED STUDY

It cannot be denied that a large majority of the men who pass the examination and get a certificate cease to study further, which shows the low regard they have for the knowledge that is to be gained by study. Since passing the examination some years ago, I have continued to study the theory and principles of mining and am much better prepared to day to take the examination than I was when I passed some years ago.

When a man is thoroughly prepared and qualified for the position of mine foreman he need have little anxiety about passing the examination, although I freely admit that there are many good practical men who would make good foremen if they had the knowledge of the theory and principles of mining that would enable them to pass the examination. They are not, however, fully equipped to make the most efficient foremen.

The aim of all candidates for the position of foreman should be to study to make themselves efficient. As a rule, the best mine foremen are those who have educated themselves and are fitted through much reading and study to solve the numerous problems that occur in mining practice. Instead of studying to prepare in a few weeks for the examination, these men have made the principles of mining a continual study. They cannot be called educated men, but they have the knowledge that qualifies them for the positions they hold.

My conclusion is, that in order to assist young men who are gaining practical experience in the mine and enable them to pass the examination and secure the necessary certificate of competency, they should be given a book containing the formulas and constants necessary for the solution of technical questions. They should, of course, have studied the theory and principles of mining sufficiently to know how to apply these formulas and constants. Someone has suggested that the Examining Board, previous to holding an examination, should outline the questions that may be asked. I believe, however, that such a proceeding would very much lower the standard of the examination. Let me say that study is the keynote to success, and without it all men must fail.

Herrin, Ill.

OSTEL BULLOCK.

Letter No. 20—I have followed with much pleasure and thought the various opinions expressed in the letters on this subject, and will say that most of the points suggested are well taken and show a keen interest in the problem under discussion.

The main question at issue seems to depend on what requirements in the examination will better reveal a candidate's fitness for the position of mine foreman. The contestants who have discussed this question appear to be divided into two general classes. There are those who would abolish all questions involving and necessitating technical and scientific training and confine the examination wholly to the realm of practice. On the other hand, there are those who maintain that all candidates for mining positions should be familiar with the theory of mining, believing this to be essential.

My thought is that both of these contentions are partly right and partly wrong. I believe that candidates should possess theoretical training as well as practical experience in mining. In other words, I would take issue with both sides and suggest a compromise of these extreme views, believing that this would produce the most satisfactory results. Expressed in a few words, my belief is that a foreman who can qualify for an examination that treats, first, of the theory and, second, the practice of mining and knowledge of the mine law, will come nearest to meriting 100 per cent., in respect to his efficiency and competency to act as mine foreman.

MINE FOREMEN MUST BE FAMILIAR WITH THE PRINCIPLES OF MINING

May I ask, Is it not of prime importance that a capable and efficient mine foreman shall be thoroughly familiar with the principles underlying the mining of coal and the operation of a mine, as well as being a man of practical experience? This is true in every industry and occupation in the country, and why, let me ask, should the coal-mining industry be any exception to this general rule?

Let me not be understood, however, as claiming that the practical solution of mining difficulties is impossible without a full knowledge of the theory and principles involved, but rather that the knowledge of these principles will greatly assist their solution and make the practical man more competent and efficient. I am a staunch believer in the union of theory and practice.

Now, regarding the use of textbooks in examination, the candidate with a fair average training along technical lines will not require them often; but there are many practical men of less technical training who

cannot be expected to remember formulas and constants required in the solution of many important mining problems.

Let me say that the training and intelligence of a candidate is not determined by his capacity to memorize these data; but rather by his ability to recognize and apply the data at hand. In other words, a candidate should know where to find and how to apply what data he needs. No intelligent man in any occupation or calling attempts to memorize the data applying to his profession, but constantly refers to the handbooks that have been prepared giving this information.

In closing, I want to say that I cannot conceive that any injury would be done candidates in examination by providing them with this data in suitable form that will not suggest the application of formulas and constants, but serve merely to give the information needed and thereby relieve the candidate of the tension he would otherwise be under in his attempt to memorize such data. He will then be able to concentrate all his energies on the actual work before him as he does commonly in his daily practice.

E. J. MAHAN, Coal Mine Scrutinizer,

Hartford, Conn.

The Travellers Insurance Co.



Checking In-and-Out System in Mines

Letter No. 12—I can recommend the following system as being efficient for the purpose of showing the exact number of men working in a mine and their location:

There is one large check board on the surface, at or near the entrance of the mine. This board is supplied with hooks that are numbered to correspond to the numbers given to the men. Every man working underground, including the daymen, is given a check number.

Before a man can enter the mine in the morning, he must receive a check bearing this number from the man in charge of the check board. He must carry this check with him into the mine and return it to the board, or throw it into a box provided for that purpose, when he comes out of the mine and goes home.

One of the outside men working on the tippie or giving out supplies to the men is always on hand for an hour when the men go to work and again when they come out of the mine at the close of the day or the end of the shift. It is the duty of the one in charge of the check board to see that each man is given his proper check when he goes in and returns that check when he comes out and goes home. If a man fails to return his check when going home, he is fined 25 or 50c.

This system has at least three advantages, which are as follows: (1) A check book is kept, which shows the check number and location of every man working in the mine. The book shows the exact number of daymen, pickmen and loaders working that shift, the record being taken from the check board after the men have gone to work. (2) The plan of taking the checks into the mine in the morning furnishes a sure means of identification if anything should happen, as each man carries his check on his person. (3) The man in charge of the board and whose duty it is to give out the checks, is able to see that each man is in a proper condition for work, before entering the mine.

In my opinion, no checking system will long survive that is left entirely in the hands of the men, with no

one in charge to see that each man receives and returns his check. In case of trouble, which is the very time when exact information is wanted in regard to the number of men in the mine, there is no reliance to be placed on such a system, since no one can tell whether every man has performed his duty and taken his check with him when he went to work.

One man can check from 200 to 300 men passing into the mine in an hour or less, and the same time will serve to check the men on their return. The cost will not, therefore, exceed 50c. a day, and the results obtained are reliable.

MAX.

Smithton, Penn.

Letter No. 13—The system of checking the men passing in and coming out of the mine, which I have used and would recommend, is as follows:

Each man is given two checks, one an entrance check stamped with his number and the second a working check stamped with both his number and the number of the section of the mine where he works. On coming to the mine in the morning, each man gets his check from the checking clerk. He gives his entrance check to the fireboss or lampman, from whom he receives his lamp on entering the mine.

At the mouth of each section in the mine there is a check board with hooks on which each miner hangs his working check as he passes into the section. This check remains on the board until the man comes out, when he must again take his check from the board. On passing out of the mine and giving up his lamp, the miner receives his entrance check and before going home gives both these checks to the checking clerk.

The mine foreman gets the number of men that have entered the mine in the morning from the fireboss or lampman, who has taken the entrance checks. Each assistant foreman in charge of a section of the mine is responsible for the men in his section. He makes careful note of the check numbers hanging on his board in the morning.

It is the duty of each assistant to remain at the mouth of his section until every man has come out and removed his check from the board. If a man fails to appear and take his check, in any section, it is the duty of the assistant in charge of that section to look the man up.

The assistant foremen report to the foreman the number of men working in their several sections, and the number is checked with the total number of entrance checks reported by the fireboss. This system has given good satisfaction wherever it has been employed.

Oliphant Furnace, Penn.

JOHN H. WILEY.

[This closes the discussion "Checking In-and-Out System in Mines."—Editor.]

Federal Regulation of Car Supply

Letter No. 1—The editorial entitled "Federal Regulation of Car Supply," *Coal Age*, Feb. 10, p. 284, reminds me of a plan for car distribution that was outlined some years ago in a certain magazine article. Since reading that article I have often wondered why this suggestion has not received more attention every time the car-shortage question calls for earnest consideration, as at the present time.

The idea of Federal regulation of car supply appeals to me strongly as offering a solution that promises to give results in economy and efficiency that are not likely to be realized in any other way. For the purpose of eliciting further comment as to the practicability of the scheme and the means to be used in putting it into effect, allow me to give a brief summary of the plan as I recall its main features.

The freight-car equipment of all transportation companies were to be merged in a single company and paid for in stock or other securities of that company. Car distribution was then to be controlled by a board of directors representing all sections of the country and the consolidated interests of the various lines. A per-diem charge was to be made for retention of cars, which would insure their movement toward concentrating yards. The consolidated company was to acquire or build concentrating yards at such prominent junction points as traffic conditions would require and provide the necessary motive power at these points.

I believe this outline summarizes the main ideas of the magazine article to which I have referred, but it occurs to me that here is an instance where Government regulation would undoubtedly prove beneficial to the railroads, shippers and all concerned. As I understand it, the railroads would be prohibited, by the adoption of this plan, from owning any freight equipment, except such as would be necessary for the construction and maintenance of their particular lines and would be paid for the balance of their equipment in United States bonds on the basis of the valuation shown in the physical appraisal now being made.

An organization for car distribution would then be effected on a plan similar to the Federal Reserve Banks, by dividing the country into districts, the affairs of each district to be under the immediate control of a board elected by railroads and shippers in each respective district, but subject to control by a central board in which the Government would have final power.

This is, of course, a mere outline, but forms a sufficient basis for the discussion of the idea. The railroads complain that they cannot finance the additional construction of motive power and the terminal facilities needed. Converting their equipment value into bonds would go a long way in this direction.

Chicago, Ill.

R. T. McKEEN.

Drilling Spadholes in Mine Roof

Letter No. 1—Anyone who has experienced the difficulty of drilling holes for spads to hold sights when surveying a mine will indorse the suggestion of W. S. Herbert, *Coal Age*, Dec. 16, p. 995, who recommends the use of a short jumper drill and hand hammer as being the best adapted for this purpose.

While some engineers may use other methods, my experience has been that the jumper drill is the most satisfactory means of drilling spadholes in different kinds of roofs that vary in hardness and often contain sulphur balls.

Unless the coal seam is very low, I would prefer to use a 9 or 10-in. jumper instead of a shorter length of drill that could be carried in the pocket, as Mr. Herbert states. This drill should be made out of $\frac{3}{8}$ -in. octagonal steel, drawn out to $\frac{1}{2}$ in. and given a cutting edge of not less

than $\frac{5}{8}$ in. The drill can be upset slightly at the striking end, although it will naturally take that form through use.

A generous amount of insulating tape wrapped around the shank of the drill to serve as a handle will be found to give a better grip and make a wonderful improvement where many holes are to be drilled. Also, it will be found more convenient to use a double-faced hammer whose striking faces are equally balanced, so that the hammer will have no tendency to turn in the hand when striking upward. This will prove less tiresome in the handling of the hammer when striking.

There is a secret in the use of a hammer when giving an upward blow. It is to hold the hammer as you would a straight staff in walking. With the hammer end down, grasp the handle firmly so that the little finger is nearest the hammer end. Then, deliver the stroke upward just as though striking the roof with the knuckles of your clenched fist. A little practice will enable one to deliver a quick strong blow in this manner with little effort.

H. M. KANARR,

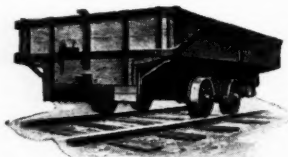
Punxsutawney, Penn. Civil and Mining Engineer.

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Working 3-Ft. Pitching Coal

Letter No. 6—Replying to the questions asked in the Foreword of Feb. 10, and assuming that the seam is 3 ft. in thickness and overlaid with 12 in. of draw-slate, let me say that I would prefer to use cars having a capacity of from 2 to 3 tons and mounted on 16-in. wheels, with a wheel base of from 30 to 34 in.

As shown in the accompanying figure, the car should be provided with an end gate, leaving the other end open provided only with an iron strap, which makes a convenient type of car for loading in low coal. The car, in this case, should have the following dimensions: Length, 8 ft.; width of bed, 54 in.; inside depth of car, 24 in. This car can be made of either iron or wood and run on a track gage of 42 in. These cars should only be used on the main roads and cross-entries.



A WATT MINE CAR

In the gateways I would use small cars about 4 ft. long and 3 ft. wide, mounted on 9- or 10-in. wheels. The coal in these cars would have a height not exceeding 2 ft. 6 in. above the rail, and the track gage should be about 22 in. The cars would have a capacity of about $\frac{1}{2}$ ton and can be run along the face on light steel rails that are held in position by corrugated steel ties having grooves cut in them to fit the bed of the rail. The rails are easily slid into the grooves, which makes a true gage of track.

At the head of each gateway is provided a sheet-iron plate 4 ft. square, having lugs riveted to its upper surface to guide the cars. This plate serves as a means of turning the car from the face track to the incline on which it is lowered. By spragging the car wheels, these small cars are lowered to the gangway by means of short handles hooked to the crossbar at the rear end of the car. At the foot of the incline the coal is loaded into one of the larger cars.

When the coal is overlaid with a hard sandstone roof it would prove more economical to blast the bottom than to rip the top, in order to give the necessary headroom on the roads. My experience in England inclines me to give preference to the disk coal-cutter for mining the coal.

These machines should always be operated by compressed air if the mine is generating any gas.

In England both electricity and compressed air were used in different places. In the use of electricity I have known the machine to become charged so that sparks and flashes occurred frequently, notwithstanding the precautions that were taken to insulate the cables, which were recoated at frequent intervals with an insulating material applied as a thick paint. Flashes were often seen on the roads where the insulation of the cable had given out.

Replying to Questions 4 and 5, I would say that while it may be possible for gas to be ignited through the action of the cutter bits, I have never known this to take place, although at times the sparks produced were bright and of considerable duration. I believe such sparking to be dangerous, however, in the presence of gas.

Regarding haulage, the best system to use, in my opinion, is that employing electric storage-battery locomotives, but the mine must be laid out so that the coal will gravitate to the shaft bottom, which is always an important matter in a pitching seam.

Assuming this seam to be from 500 to 1000 ft. deep, and taking into account its thickness and inclination, I am strongly in favor of adopting the longwall method of mining the coal. The room-and-pillar method of mining would not only require much brushing and timbering, but there would be a considerable percentage of the coal lost in the pillars.

With a good strong floor and a roof that breaks or settles uniformly, back of the timbers, I believe, the use of face conveyors to be of great advantage. One feature that often hinders their use is the habit of many miners to carry intermediate packwalls. I would eliminate these as quickly as it could be done without alarming the men, and use only roadpacks. In so doing I have found that the roads have a less tendency to heave. However, taking everything into consideration in this case, I should prefer to use the small cars described at the beginning of this letter in preference to face conveyors.

It is important to use a systematic method of timbering, setting the posts in rows parallel to the face and at such a distance from the coal that the cutting machines will be free to work along the face. In places, in England, it was necessary to use crossbars supported on posts and notched into the coal, so as to give the necessary support to the roof over the machine when mining the coal.

Linton, Ind.

W. H. LUXTON.

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Mine-Accident Record

Letter No. 14—Permit me to refer to the statement of W. L. Morgan, *Coal Age*, Jan. 20, p. 163, in which he says, "Of all accidents occurring in the mines through carelessness, those that show the greatest recklessness on the part of the miner are where men return to a shot that has failed to explode in the time expected."

While I quite agree with Mr. Morgan in the opinion that the practice of miners going back on failed shots is an exhibition of recklessness and the cause of many serious accidents, I believe that the heavy or hard tamping of dynamite and the careless drilling out of failed dynamite shots, as practiced by some miners, show a greater recklessness than that of going back on failed shots. In fact I believe the number of accidents occurring in the former instance is even greater than in the latter.

In a mine where I worked two miners were drilling out, with hammer and steel, a small failed dynamite shot that had been tamped very hard. While so engaged the shot exploded, but, fortunately, neither of the men was seriously injured.

In an adjoining mine on another occasion, an experienced miner was carelessly drilling out, with hammer and steel, a failed dynamite shot when it exploded. The man lost one eye and one hand, besides being badly burned and disfigured about the face.

In still another mine near-by, a miner was in the habit of tamping dynamite shots very hard. The other miners would not stay about his place while he was doing his tamping. One day he was tamping a slate shot, in this same manner, when it exploded, killing him instantly.

I have read of serious accidents occurring from the careless thawing of frozen dynamite, but none of these have come under my personal observation.

Dayton, Tenn.

JOHN ROSE.

[Many contributors to the discussion of "Mine-Accident Record" appear to overlook the fact that this is intended to be a record of mine accidents, past and present. Instead of reciting one or more accidents that have occurred in their experience, writers are prone to tell how accidents can best be prevented or avoided.—Editor.]

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Cleaning Up a Roof Fall

Letter No. 12—It should not be necessary to ask the question suggested in the inquiry that appeared in *Coal Age*, Jan. 20, p. 165, in regard to the duty of a mine official. However, as long as human nature is what it is, such questions will continue to be asked.

The fact that men filling the position of timberman, in mines, are usually men of experience in that class of work, does not relieve a mine foreman, assistant foreman, or any other official, of his personal responsibility in the direction of the work in his charge.

While the men performing dangerous work, such as cleaning up a roof fall or timbering a place, must understand what is necessary to be done for their own protection, it is just as essential that the mine official in charge choose competent men for such work and give them all necessary instructions in regard to pulling down loose rock and timbering the edges of a fall before starting to clean up the fallen slate.

Although not familiar with the particulars of the accident mentioned in this inquiry, my associations in mines have been such as to bring me continually in contact with just such accidents as the one there described.

Speaking, therefore, from the standpoint of one who is interested in the investigation and prevention of mine accidents, my opinion is that any mine official should instruct a workman whom he sends to clean up a cave, so that there will be no doubt that he will proceed with the work in a safe manner and take all necessary precautions to avoid an accident.

Such instructions should always be given notwithstanding the man is an experienced miner. It is the duty of an official both to his employers and to the men in his charge. A mine official cannot overlook any known condition that involves a possible accident through the ignorance or carelessness of the workman.

Salt Lake City, Utah.

UTAH MINER.

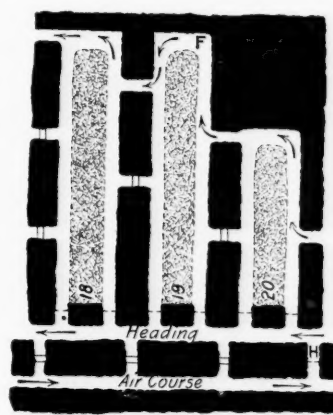
Roof Troubles Overcome

Letter No. 2—In reply to the inquiry of Rudolph Valduga, who asked for the best method of working a seam of coal from 4 to 5 ft. in thickness when overlaid with a roof that flakes off and falls under the action of the air current, permit me to give some of my own experience in working a somewhat thinner seam, under similar conditions, some years ago.

The coal in that mine was but 3 ft. thick, which required the taking down of from $2\frac{1}{2}$ to 3 ft. of roof on the roads, to make height for the mules. The roof started to cut in the entries. The first evidence of this was the appearance of a white line on the roof in two of the entries, as though it had been drawn by a chalkline.

A little later the roof cut back 4 in. over the coal, and it seemed as though there was great pressure exerted by

the overhead weight, which caused much trouble in supporting the roof on the roads. The same trouble was not observed, however, in the rooms, which were driven from 30 to 40 ft. wide with perfect safety. The accompanying figure shows a good plan of driving wide rooms. The rooms here shown are driven 42 ft. wide with 30 ft. pillars between them. Each room has two necks, a track being laid up along the rib on each side of the room,



DOUBLE-NECK ROOMS

and the space between utilized for the storage of waste.

A like case occurred in the Thomas mine at Whiteville, Tenn., where the coal was overlaid with a very hard slate roof. It could not be said that this slate disintegrated, although it fell in great flakes both on the roads and in the rooms.

At one time it was thought that the mine would have to be abandoned. But the plan being adopted of widening the rooms so as to give more space for storing the slate and reduce the expense of handling this waste, much to our surprise the roof trouble in the rooms ended at once. It then became possible to drive the rooms to their full distance without further trouble.

The explanation given was that this roof was of a nature that required more room for expansion, which was afforded by widening the rooms. No difficulty was experienced in drawing back the pillars between the rooms, and from 90 to 95 per cent. of the coal was taken out.

Let me suggest that the same conditions may exist in Mr. Valduga's mine. The widening of the rooms, however, would not remedy the trouble on the entries, and I would recommend the use of gunite to coat the roof and the ribs if necessary, to protect them from the action of the air. This can be done by means of the cement gun.

The cement gun is manufactured by the Cement-Gun Co., of Allentown, Penn. The application of gunite has proved very successful in preventing the disintegration of a mine roof that tends to slack under the action of the air current. I have known a number of instances where this method was adopted and gave immediate relief.

Morgantown, Penn. W. D. ROBERTS.

Inquiries of General Interest

Face and Butt Cleats, or "Joints"

Kindly explain if the face and butt cleats found in coal seams have any general course or direction. Do the face cleats in all coal fields have practically the same direction? As far as my observation has gone, the face cleats in this district all run about N 30° W.

Corona, Ala.

STUDENT.

The direction of the face and butt cleats, in any locality, depends upon and conforms to the general inclination of the formations in the district, the face cleats being parallel to the anticlinal or synclinal axes, while the butt cleats, or "joints," as they are often called, are at right angles to these axes.

Since the synclines and anticlines, in different districts, may bear no relation to each other, it follows that the cleats and joints in different coal fields do not necessarily have the same direction.

It is generally believed that the face cleats in coal seams are the result of the rising and sinking or folding of the formations. When this movement has taken place along certain axial lines the effect has been to crevice the formations in a direction parallel to the axis. The crevices, or lines of weakness, so developed are known as the face cleats. The butt cleats, or joints, which are at right angles to the face cleats, are supposed to be the result of shrinkage in the formation.

It is quite common to find the face cleats, in any particular locality or district, running practically in the same general direction. This is particularly true where the conformation is regular and corresponds throughout the district.

Mine Equipment

(a) Can you give me the address of a firm manufacturing an equipment for handling cars down a slope and consisting of two large sheave wheels set tandem in a frame; also, a firm manufacturing a hinged switch that can be thrown back off the track when not in use, and which maintains an unbroken rail in the main track?

(b) Kindly explain the use of a "McGinty" for handling cars on a slope or in rooms driven to the pitch. (c) I would like to hear from parties who have had experience in the operation of a coal mine in a seam pitching about 15 deg. and learn their methods of working and handling the coal.

C. F. THOMAS, JR.

Grand Junction, Colo.

(a) An incline machine consisting of two sheaves set in a frame, for handling cars on inclines, is manufactured by S. B. Stine, Osceola Mills, Penn.

The switch referred to is probably one having a movable latch for the switch point, and a latch frog consisting of a short section of rail that is thrown across the rail of the main track and held in position by a pin when in

use. The arrangement provides for an unbroken rail in the main track. This type of switch is often made by the company blacksmith and not usually listed in manufacturers' catalogs. We would refer, however, to the Cincinnati Frog & Switch Co., Cincinnati, Ohio; the Kilby Frog & Switch Co., Birmingham, Ala.; and the Orenstein-Arthur Koppel Co., Koppel, Penn. These firms manufacture all kinds of track equipment.

(b) A "McGinty" is a low truck running on separate rails within the car rails of an incline track. Its weight is between the weight of the empty and loaded cars. It is attached to a rope passing over a headsheave, the other end of the rope being attached to the loaded car to be lowered on the incline or the empty car to be raised. This arrangement is known as a self-acting incline, the movement of the cars being controlled by a brake attached to the head sheave.

(c) Follow the discussion now running in *Coal Age*, "Working 3-Ft. Pitching Coal," and read the article by Samuel Dean, Feb. 10, p. 260, which should give all the information desired.

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Need of Drawing Timber

Kindly permit me to ask if there is any actual necessity in drawing all standing timber from the goaves and packs, in longwall work by the advancing method. Will timber left standing in the packwalls give trouble, and how? Will not the drawing out of all timber cause a greater roof settlement and require more brushing of the roof on the roads?

J. R.

—, Ohio.

The drawing of timber in longwall work is an absolute necessity, in order to secure a uniform settlement of the roof on the packs and prevent any undue weight being thrown forward on the face of the coal. This is an essential quality in this method of working.

In all longwall work experience is required to maintain a uniform traveling weight that advances with the extraction of the coal. This weight must be just sufficient to break down the coal.

The effect of leaving any standing timber in the goaves will be to throw too great a load forward on the face, and the coal will be crushed. Also, the mining will be made more difficult and, at times, the roof will break off close to the face of the coal. Should this happen, the roof action would be destroyed, and it will be with great difficulty that the trouble can be overcome and a working face again established.

The amount of brushing required on the roads, in order to maintain the necessary headroom, will depend on the nature of the roof and floor, thickness of the seam and the strength of the packwalls. All roadpacks must be well built and made of uniform strength and thickness. Timber left standing in the packs will have a tendency to increase roof troubles on the roads.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—A mixture of marsh gas and air at its highest explosive point is passing in an airway 4x5 ft. in section, at a velocity of 500 ft. per min.; what quantity of fresh air must be added to this current so that you will not be able to detect gas on a safety lamp?

Ans.—A mixture of pure marsh gas and air at its most explosive point contains 9.46 per cent. of the gas. The volume of air passing in this 4 x 5-ft. airway is then $4 \times 5 \times 500 = 10,000$ cu.ft. per min. The air current being charged with gas so that the mixture is at its most explosive point, the quantity of gas in this current is $10,000 \times 0.0946 = 946$ cu.ft. per min.

The ability to detect low percentages of gas in an air current will depend both on the kind of lamp used and the experience of the observer. When using a common unbonneted Davy lamp the average observer will rarely detect 2 per cent. of gas in an air current. On the other hand, when using a lamp burning a volatile oil some observers claim that they can detect the presence of gas though as little as 1 per cent. is present in the current.

Taking 2 per cent. as the point where the gas ceases to be detected by the observer, the total volume of air and gas must then be $946 \div 0.02 = 47,300$ cu.ft. per min.; and the volume of air that must be added to the current to produce this condition is $47,300 - 10,000 = 37,300$ cu.ft. per min.

On the other hand, assuming that the observer fails to detect gas, only when the quantity present reaches 1 per cent., the volume of air and gas passing must then be $946 \div 0.01 = 94,600$ cu.ft. per min.; and the quantity of air to be added, in that case, is $94,600 - 10,000 = 84,600$ cu.ft. per min.

Ques.—If there are 8500 cu.ft. of marsh gas and air passing in an airway, and the mixture is at its maximum explosive point, how much air must be added to render the mixture harmless?

Ans.—The volume of gas present in this current is $8500 \times 0.0946 = 804+$ cu.ft. per min. The highest percentage of gas present in mine air that can be considered harmless, or that will be safe from ignition under the various operations performed in the mine, will depend very largely on the conditions existing in that mine with respect to the inflammability of the coal, its hardness, and the method of mining and blasting employed.

While 2 or even $2\frac{1}{2}$ per cent. of gas is a safe limit in some mines, other mines can hardly be considered safe when more than 1 per cent. of gas is present in the air, owing to the explosive nature of the fine dust produced in large quantities and floating in the mine air.

Therefore, considering 2 per cent. of gas a safe limit, the total volume of air and gas present, in that case, must be $804 \div 0.02 = 40,200$ cu.ft. per min.; and the volume of air that must be added to the current to render it harmless is then $40,200 - 8500 = 31,700$ cu.ft. per min.

On the other hand, taking 1 per cent. of gas to be the safe limit, the total volume of air and gas must then be $804 \div 0.01 = 80,400$ cu.ft. per min.; and the quantity of air to be added, in that case, is $80,400 - 8500 = 71,900$ cu.ft. per min.

Ques.—(a) How many 2-in. pipes will discharge the same quantity of water, in the same time and under the same head, as a single 6-in. pipe? (b) How many 3-in. pipes will give the same discharge as one 6-in. pipe?

Ans.—(a) The diameter ratio of the pipes, is $6/2 = 3$; and the number of 2-in. pipes required to give the same discharge as a single 6-in. pipe is therefore $\sqrt{3^5} = 15.6$, say 16 pipes.

(b) The diameter ratio, in this case, is $6/3 = 2$, and the number of 3-in. pipes required to give the same discharge as one 6-in. pipe is therefore $\sqrt{2^5} = 5.6$, say 6 pipes.

Ques.—A fan 12 ft. in diameter and having an equivalent orifice of 30 sq.ft. is running at a speed of 90 r.p.m. If the equivalent orifice of the mine is 19 sq.ft., what is the manometrical efficiency of the fan and what quantity of air should this fan deliver at the given speed?

Ans.—This question was asked in a mine foreman's examination some years ago, and is not a fair question in examination. Its solution is based on the assumption that the pressures due to the passage of an air current through the fan and through the mine are proportional to the squares of the respective equivalent orifices of the fan and the mine, from which it is deduced that the manometrical efficiency of the fan is determined by the ratio of the square of the equivalent orifice of the fan to the sum of the squares of the respective equivalent orifices of the fan and the mine.

On this assumption, calling the efficiency of the fan K , the equivalent orifice of the fan O_f and that of the mine O_m , we have

$$K = \frac{O_f^2}{O_f^2 + O_m^2} = \frac{30^2}{30^2 + 19^2} = \frac{900}{1261} = 0.7137$$

which shows the manometrical efficiency of this fan to be 71.37 per cent.

The quantity of air this fan will deliver under the assumed conditions can only be approximately estimated from the formulas given on page 37 of Daniel Murgue's "Centrifugal Ventilating Machines," which gives for the volume of air discharged per minute

$$Q = \frac{1}{3}(O_m D n \sqrt{K}) = \frac{1}{3}(19 \times 12 \times 90 \sqrt{0.7137}) \\ = 5780 \text{ cu.ft. per min.}$$

This result is far too small for the conditions named.

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Correction

A mixture of pure marsh gas and air, at the higher explosive limit, contains 16.67 per cent. of gas and not 10.67 per cent., as stated in the fourth line of the answer to the third question, *Coal Age*, Mar. 3, p. 411.

Book Reviews

Work on Industrial Safety

PRACTICAL SAFETY METHODS AND DEVICES. Manufacturing and Engineering. By George Alvin Cowee, manager, Bureau of Safety, Utica Compensation Insurance Corporation. Pages x + 428 + 6 index; 6x9 1/4 in.; 127 illustrations. D. Van Nostrand Co., 25 Park Place, New York, publisher. Cloth boards. Price, \$3 net.

This volume meets a real need of the public. It draws together safety devices from all fields. There is hardly anything in it that an adapter would cut out if he were preparing it for the exclusive use of the coal industry. Here and there he might change a word, and here and there he might revise the order of chapters, but almost no material would have to be cut out, for coal-mining officials have all manner of construction and machinery to handle and so have accidents of all kinds to confront.

In fact the mine manager has had so much information supplied him by the United States Bureau of Mines relative to the specific hazards of the industry, that he will be more likely to purchase this volume because of its complete account of the right way to meet, not the specific, but the incidental, hazards of coal mining—those hazards which arise from the use of power and machinery.

The coordination of the efforts of the various parts of industry in meeting overlapping needs is one reason for the National Safety Council and a very real cause for the publishing of a book of this kind. Certain it is that while manufacturers might resent the space given to mining hazards and explosives, the mining men cannot but be pleased at the extensive treatment given to the power and machine sections—parts which come first and which the reviewer believes the reader will peruse first.

Some Common Fallacies About Mine Watering

The writer of the book seems abundantly able to handle mining matters, though in his statements regarding ventilation he might well be more fortunate. On page 297, speaking of winter conditions, he says, "The air which enters the mine is cooled below the temperature of the workings." He means that the air is cooler before entering the workings than after it has entered, but the words as ordinarily interpreted would mean just the reverse.

He says also, on page 305, that if fan-engine houses and fanhouses are made of combustible material and catch fire, the intake "will force smoke instead of fresh air into the mine." This is only true if force fans are used. Many mines have exhaust fans. If they are housed in material which is combustible, they are almost sure to be destroyed. So the recommendation is excellent, though the reasons are not quite adequate.

Also, on page 314, the author says, "If the weather be cold, the intake air may be preheated by exhaust steam." There would be little advantage in this heating if the steam did not moisten the air. Suppose we heat the air to a higher temperature than the mine without moistening it. We give it a greater capacity for moisture. It then dries up the entrances to the mine, thereby, it is true, gaining a little moisture. This saves the interior from some of the desiccating effect at the expense of the greater dryness of the adits or the exits. The exhaust steam is not used mainly for the purpose of heating the air, but in order to give it moisture. The higher the temperature the more moisture it will take from the steam and thus increase the moistening of the interior of the mine.

This book contains articles on the need for safety work, organization of safety committees, observations of the fundamentals of safety work, buildings and the fire hazard, exit fire drills, organization of fire brigades, boilers, engines, elevators, electricity, transmission, machine tools, grinding machinery, wood-working machinery, common machines, iron and steel, handling and storing material, construction work, steam and electric railroads, mining and quarrying, explosives, miscellaneous hazards, general rules and rules for foremen, sanitation, illumination, heating and ventilation, welfare work, occupational diseases and first aid to the injured.

The reader will note the item of explosives, which is quite capably treated. Let us hope that some day we may remove explosives entirely from our hazards by removing them from our mines. Occupational diseases is scantily treated, mining diseases not being even considered.

Use of Coal for Railroad Work

PROCEEDINGS OF THE EIGHTH ANNUAL CONVENTION OF THE INTERNATIONAL RAILWAY FUEL ASSOCIATION, Chicago, Ill., May 15 to 18, 1916. Pp. 356 + 3 index; 6x9 in.; several charts, plates and other illustrations. J. G. Crawford, secretary-treasurer, I. R. F. A., 702 East 51st St., Chicago, Ill. Price: Flexible leather, \$1; paper cover, 50c.

The consumer has for a long time been telling the producer of coal how important it is for the latter to conserve his mineral resources to the uttermost and how necessary it is for him to do his work efficiently so as to keep down the cost of coal. It is always more pleasant to rearrange your neighbors' business than it is to regulate your own. However, self-regulation is a most profitable business, and the fuel engineers of the various railroads, who to do them justice have done less criticizing of the coal man than anyone else, are getting together to do a little conserving on their own account. They propose to save by reducing their output of carbon monoxide and smoke, by sparing the landscape and the passengers the generous dosage of cinders with which in times past travelers have been favored, and they are going to lower the losses in the ash.

Use of Powdered Coal on Railroads Increasing

This volume of "Proceedings" of the International Railway Fuel Association contains a report of the use of powdered coal in locomotives on the Chicago & North-Western, the New York Central R.R. and the Delaware & Hudson Co. The work is making much progress. The report says:

Since our last meeting the Chicago & North-Western Ry. has adapted an Atlantic-type passenger locomotive [to the use of pulverized coal] and is now operating it in its regular passenger-train service between Chicago and Milwaukee. The Delaware & Hudson Co. has just put into freight service a new Consolidation locomotive, probably the largest of this type in the world. [It is equipped to burn powdered coal.] The Delaware & Hudson Co. is also installing a complete fuel-drying, pulverizing, storage and discharging plant, and equipping its stationary boilers at Olyphant, Penn., for burning the waste tailings from anthracite culm banks.

The Missouri, Kansas & Texas Ry. is installing a complete pulverized-fuel preparing plant at Parsons, Kan., and applying equipment for burning pulverized coal and lignite in its stationary boilers and locomotives.

Various other steam railways, among which may be mentioned the Atchison, Topeka & Santa Fé, Grand Trunk, Southern Pacific, Kansas City Southern, Chicago Junction, and Central Railway of Brazil, are now considering the use of pulverized fuel for locomotive service, the last named having already decided to adopt it after an exhaustive three months' investigation made in the United States.

Coal Can Be Pulverized for 5c. a Ton

The Fuller Engineering Co., of Allentown, Penn., states that the labor cost of operating a 5-ton pulverizing plant is 45c. per ton pulverized, whereas a 230-ton plant could be operated for a labor cost of 5c. per ton. The pulverization problem is hard not so much because of its inherent difficulties as because it has barely got beyond the experimental stage and is being tackled in most cases academically.

Leaving the pulverization problem, the book proceeds with papers on "The Influence of an Intimate Knowledge of Coal on Fuel-Economy Efforts of Enginemen and Others" and on "Interpretation of Coal Analysis with Special Reference to Noncombustibles." Eugene McAuliffe, now with the West Kentucky Coal Co., has an article on "The Functions of a Railroad Fuel Inspector." C. E. Leshner, of the United States Geological Survey, describes "Field Apparatus for Determining Ash in Coal."

Other papers are: "The Human Fireman," "Care of Locomotives with Relation to Fuel Economy," "What the Transportation Official Can Do To Promote Fuel Economy" and "Coal Distribution Record System." A well-illustrated report is given on "Fuel Stations." Reports by committees on firing practice, on front ends, grates and ash pans, on fuel tests, on fuel accounting and on the storage of coal are also included in the publication. The book restores our confidence in fuel experts. We used to think that they existed just to badger coal producers. It appears that they are also trying to economize fuel. It is quite clear that the public is just as much in duty bound to save coal after it has been mined as the coal producer is to conserve it before it is mined.

Coal and Coke News

Washington, D. C.

Many protests from coal interests throughout the country have been filed with the Interstate Commerce Commission against the proposal to assess a flat charge of \$5 per car for reconignment or diversion of carload freight. As a matter of fact the protests of the coal interests have been backed by protests from representatives of the leading lumbermen, grain men, shippers of perishable and miscellaneous freight. The railroads maintain that the \$5 reconignment charge proposed is legitimate because reconignment is a service outside of the ordinary line haul rate, and the Commission has often entered opinions sanctioning the assessment of charges for such special services.

Guy M. Frear of the Cincinnati Chamber of Commerce and the National Industrial Traffic League went before the Board of Suspension of the Commission and petitioned that the proposed reconignment charge be cancelled. He claimed that reconignment instead of adding to congestion expedites the movement of traffic. Therefore, he said, the imposition of a charge amounts to the infliction of a penalty upon the shipper who thus helps in expediting traffic. The shippers have also claimed that reconignment aids both the shipper and the railroad to make use of any slack in traffic. A shipper may bill shipments to fictitious points while cars are available and reconsign such shipments to a purchaser after a sale is made. This keeps the traffic moving and enables the railroads to make use of surplus cars, while at the same time it tends to forestall any shortage due to a sudden demand for cars. The shippers pointed out that if the railroads would guarantee to deliver shipments within a specified time the necessity for resorting to reconignment might also be relieved considerably.

Rates Were Found Excessive

In a decision issued in the case of the Buffalo Union Furnace Co. and others against the Buffalo & Susquehanna and other railroads, the Interstate Commerce Commission found a discrimination to exist in coal rates. The adjustment of rates on coal and coke from points in the Reynoldsville district served by the Buffalo & Susquehanna R.R. to Buffalo, Lackawanna, and Harriet, N. Y., and other points in the so-called Buffalo-Black Rock switching district, was held to be unduly prejudicial to the extent that the group rate on coal from the points of origin to the territory of destination named exceeds 80 per cent. of the rate contemporaneously maintained on coke from Tyler and Sykes, points on the same railroads, to Lackawanna. The Commission ordered the railroads to remove this discrimination by May 10 next.

Experienced Engineers will be Valuable

That mining engineers, who have had experience in coal mines, would be especially valuable to the country and to the industry in case of an emergency is recognized by the Bureau of Mines. With this in view the Bureau is preparing to compile a list of as many of the mining engineers of the country as will cooperate in the effort. It is expected that an especial effort will be made to secure this information from men affiliated with the mining of coal, copper, iron and others of the minerals which would be most needed in case of an emergency. A circular containing a number of questions, which look to the establishment of individual fitness for special service and how and where the engineer could be of most use to the country, will be sent out.

In the hope of developing improvements which can be used in rock dusting machines, the Bureau of Mines is working on a mechanical device for applying rock dust in mines.

Much interest is being manifested in the mechanical recorder which is being used by the Bureau of Mines, at its experimental mine, near Pittsburgh, for measuring the rate of detonation of explosives.

The call for an extra session of Congress April 16, relieves the Bureau of Mines of its anxiety in regard to the appropriations for the continuance of its work after July 1. The Sundry civil bill, which provides the necessary funds for the Bureau's work, failed in the legislative process which overtook the late Congress. Had the extra session not been called until June 1, it was feared that the appropriation could not have been put through the legislative machinery in time to prevent embarrassment to the Bureau in its work.

Some requests are reaching the Bureau of Mines asking that one of the three mining experiment stations which are to be authorized this year go to a coal-mining region. Since coal-mining problems are being handled almost exclusively at the large station of the Bureau at Pittsburgh, probabilities that an additional coal station will not be provided at once.

HARRISBURG, PENN.

On paper bearing the name of H. M. Chance and Company, consulting mining engineers, 839 Drexel Building, Philadelphia, letters have been sent to the members of the Pennsylvania legislature asking them to oppose the bill introduced by Senator Lynch and Representative Dawson as well as other remedial mine cave legislation that has been or will be introduced.

The letter states that a great increase in the price of coal is threatened by the proposed legislation and that the cave dangers have been exaggerated, or are untrue.

The letter is the first public attack of those opposed to mine cave remedies and is so worded as to create doubts in the minds of legislators from sections other than the coal regions as to the need of laws to protect property in the anthracite coal regions.

The letter reads as follows:

"A great increase in the cost of coal is threatened by proposed coal mining legislation such as the 'Scarlet' and other bills that may come before you for action.

A Philadelphia newspaper and some other papers have undertaken a campaign in the interest of surface property owners and residents in the anthracite region to secure the passage of laws to stop the so-called 'robbing of the mines.'

The statements made in support of such legislation are exaggerated or untrue. The object seems to be to secure drastic laws whereby the police power of the state may be used to force changes in mining methods. Such changes will greatly increase the cost of anthracite coal to the consuming public. If such legislation is enacted we may within a few years expect coal at retail to cost the consumer from \$10 to \$15 per ton.

This legislation appears to be intended to use the police power of the state indirectly to protect property rights not entitled to protection by such means. To popularize this movement and gain sympathy and support of the legislature certain dangers to residents of the region have been pictured in grossly exaggerated terms, while engineering means to remove or reduce these dangers are entirely ignored.

The operation of mines always involves some slight danger to those upon the surface and also some risk of damage to property. This is not peculiar to the anthracite regions of Pennsylvania, but is true of mining in all parts of the world. In some small areas the value of town lots and surface improvements may exceed the value of the coal underlying the surface, but the newspapers have not told the public that in more than nine-tenths of the whole region the value of the surface and improvements is so small as to be practically negligible, while the value of the coal underlying the surface is very large.

We do not understand that the advocates of such legislation are supported by mining engineers of standing familiar with conditions in the anthracite regions, nor by specialists of the U. S. Geological Survey, of the U. S. Bureau of Mines, or of our state mining organization. Those familiar with the conditions, and therefore entitled to be heard, do not advocate the enactment of such laws.

We therefore trust that you will oppose the passage of legislation of this kind because a true and disinterested statement of the facts has not been obtained, upon which the legislature can act with the intelligence that the importance of the matter demands. But few members of the legislature have close personal knowledge of these conditions or how such legislation will affect the consumer, the operating companies and the local owner of the surface. The people have the right to protest against legislation which will directly and largely increase the cost of anthracite coal, and therefore, in the interest of the public, we suggest that action be deferred until the effect of such legislation upon the rights of the people is ascertained.

As for many years we have been particularly familiar with the mining of anthracite coal, with methods used underground, with its effects upon the surface and with the cost of mining and preparing the coal for market, we feel qualified to speak upon this subject. With increasing depth of the mines and the necessity for working coal veins of small thickness, the average cost of mining and preparing anthracite coal has increased and will continue to increase as less of the thicker and more easily mined coal is available, and as more coal must be mined from the thinner and deeper beds. If to this constantly rising cost we add a very large additional cost, due to the passage of the proposed legislation, anthracite coal will quickly become a luxury of the rich and the masses of the people will be forced to burn soft coal. This will involve enormous property loss from damage by smoke in all our cities and towns throughout the State

of Pennsylvania and also in other cities and towns in which anthracite coal is the fuel now used for heating and cooking. It is not perhaps, an exaggeration to say that this loss from damage by smoke may easily be many times greater than the total value of all the surface improvements in the whole of the anthracite regions."

It is taken for granted at the capitol that this letter is backed by the operators, and a hard fight is expected, as the Governor and Attorney General are determined that something must be done for the people in the anthracite region.

PENNSYLVANIA

Anthracite

Shamokin—A number of mines in this region were flooded through several feet of snow on the mountains melting on Mar. 7. The lower levels of a number of collieries were flooded so badly that they were abandoned for several days.

The Delaware & Hudson Co., Scranton, has acquired six anthracite collieries heretofore operated by the Susquehanna Coal Co. About six thousand employees are engaged at the properties.

Stoyestown—Isaac Overholt of Mount Pleasant, Penn., has purchased a large coal tract in this vicinity. This tract includes several large farms. It is expected that the coal will be developed at once.

Sagon—Liquor dealers and beer team drivers from surrounding towns have been notified by the Susquehanna Coal Co. to discontinue using its thoroughfares to Sagon, Hickory Ridge, and other mining settlements with wagons loaded with "wet" goods. The company has determined these villages shall be "dry," hereafter so far as it can aid in making them so.

Scranton—The Myrtle Coal Co. has acquired the Meyers culm banks, near Tamaqua, consisting of about 100,000 tons of culm; the material will be used for the manufacture of coal briquettes. The property has been held by Daniel Slattery and Dr. N. H. Stein.

McAdoo—A local movement has been inaugurated at McAdoo and neighboring sections for the creation of an additional mine inspectionship in the district.

Pottsville—Notwithstanding the general introduction of electric locomotives in the coal mines, there is still a demand for mules, according to Dr. I. C. Newhard, chief veterinary of the Philadelphia & Reading Coal and Iron Co. who is now in St. Louis trying to buy several hundred animals, the price of which has soared because of demands from Europe.

Port Carbon—The Philadelphia & Reading Coal and Iron Co. is preparing to install electric power equipment at the Knickerbocker mine and both Fowler and Jackson villages will get electricity for domestic purposes from the colliery plant.

Bituminous

Punxsutawney—The tippie of the Pardus Coal Mining Co. was destroyed by fire thought to have been of incendiary origin on Mar. 7, with a loss of \$22,000. The tippie had a capacity of 1800 tons daily and 250 men were thrown out of employment by its destruction. According to officials of the company the fire originated in much the same manner as that which destroyed the Jefferson & Clearfield Coal and Iron Co.'s tippie at Reynoldsville, 4 miles from the Pardus plant, causing a loss of \$30,000. Coal mine operators believe that a group of tippie destroyers is at work in this district.

After a chase covering more than a year, authorities arrested Carmino Catalfo, aged 35, alleged to have blown up the tippie of the Anita Coal Mining Co. at Horatio, 4 miles South of Punxsutawney, in October, 1915. Dynamite was used. Subsequent to the explosion an attempt was made to assassinate officials of the company, it is said. Catalfo was arrested in Philadelphia last week and has been taken to Punxsutawney to await trial.

Broadford—Fire, thought to have been caused by a spark falling into the storage bin, of the Rist tippie of the H. C. Frick Coke Co., totally destroyed the bin and a great portion of the tippie to the extent of several thousand dollars damage. The Rist mine is almost worked out and would have been abandoned in a few months, therefore the company has not decided whether or not it will rebuild the plant. About 100 men are thrown out of work by the fire.

Monongahela—The Catsburg mine on the Monongahela River resumed operations a few days ago after being idle for two and one-half years.

Farrell—A new railroad is said to be planned from Nutwood, Ohio, to Farrell in order to reach a 200 acre coal tract recently purchased by the New York Central interests.

California—C. W. Braznell, purchaser of two tracts of coal fronting on the Monongahela River between Denbo and Vesta No. 5 mine, has awarded contracts for sinking shafts immediately, for the development of the property.

Meyersdale—H. G. Evans of Frostburg Md., has made a record in mine opening. No coal was in sight when he started a force of men in the morning, but they were fortunate enough, after removing a few loads of dirt to find the coal on the outcrop of the big vein. It was exceptionally thick running about 9 ft. By afternoon they were shipping coal. The coal was transported from the mine to the railroad cars on the Cumberland & Pennsylvania R.R. by wagons.

Scottsdale—The West Overton Coal Company, Ltd., has purchased a tract of coal in Westmoreland County. The coal is in the 9-ft. bed and will be developed at once.

Pittsburgh—The annual meeting of the Connellsville Coal Tariff Association was held at the Duquesne Club Mar. 6. The meeting was largely attended by members of the association. The following were elected members of the executive committee to serve for the ensuing year: Scott Stewart, general manager W. J. Rainey interests, chairman; R. M. Fry, general manager Orient Coke Co., secretary and treasurer; C. E. Lenhart, vice-president Producers Coke Co.; J. E. Perry, general manager of mines Republic Iron and Steel Co.; J. H. Hillman Jr., Hillman interests; W. L. Byers, sales manager, Producers Coke Co.; and Thomas McCaffrey, general superintendent Brier Hill Coke Co.

Johnstown, Penn.—The Pennsylvania, and Johnstown & Stony Creek railroads were directed by the Public Service Commission on Mar. 7, to establish upon one day's notice amendments or supplements to existing tariffs for the hauling of coal from mines of the Valley Smokeless, Ideal and Sunnyside coal companies, operating in Cambria County. The portion to be allowed the Johnstown and Stony Creek shall be 4½¢. per ton. The decision in the case holds that the complainants have been discriminated against by the Pennsylvania company and that they should be allowed to compete with other coal shippers in the Clearfield district on the lines of the Pennsylvania R.R. "upon equal terms as to rates for transportation."

Charleroi—The sale of 17 acres of coal land near Dunlevy has been made by the Mellon interests of Pittsburgh to the Vesta Coal Co., a subsidiary of the Jones & Laughlin Steel Co. The tract will be developed immediately through the old Vesta No. 1 mine opening. According to reports the consideration was \$200,000.

Connellsville—M. J. Roland and Washington Herd have purchased 25 acres of surface, two tenement houses and several acres of coal in Bullskin Township, near the McClure mines from Mrs. Margaret Barkley. The consideration is not made public. The property will be developed at once, a tippie erected and coal shipped from the McClure sidings.

Connellsville—Shipments of coke from the Connellsville and lower Connellsville region recently amounted to 342,000 tons weekly, this being a loss of 10,000 tons as compared with the previous week. The decrease in shipments is attributed to the scarcity of cars so few cars being available on one of the roads that distributing crews were instructed not to report for duty. Production amounted to 346,463 tons, being a gain of 7000 tons over the previous week.

Canonsburg, Pa.—Three men are known to have been killed and seven others are missing as a result of two explosions at the mine of the Henderson Coal Co. at Hendersonville, five miles from here, early Mar. 3. About 20 men were at work at the time, but seven were rescued shortly after the blast occurred, and three others were removed later. The cause of the explosion has not been determined. Rescue teams from the Pittsburgh station of the Bureau of Mines and also from neighboring mines entered the workings, but made little progress for some time owing to the great amount of debris which blocked the passageways.

WEST VIRGINIA

Mullens—The Thrace Fork Coal Co. has been sold by Congressman Edward Cooper, principal owner, to J. T. Wilson of Boston, representing large coal land owners and operators in the vicinity of Mullens. The property consists of 600 acres, and the price paid is said to have been \$150,000.

Charleston—It is estimated that only about 5000 cars belonging to the Kanawha & Michigan are on the owning line, the remainder of the 50,000 cars belonging to this road being on other lines of the New York Central system. Most of the cars of this road are said to be in use in handling commodities other than coal.

The names of the towns of Mucklow, Wacoma, and Tamsburg which have been long associated with the history of the Paint Creek Valley, have been officially changed to Gallagher, Livingston, and Whittaker, respectively. Hickory Camp is to be known in future as Ireland. The M. A. Hanna Co., of Cleveland, recently purchased the Paint Creek company's holdings, and is making many improvements. Michael Gallagher is general manager of the company's operations.

Fairmont—A survey of the Baxter mine of the Monongahela Valley Traction Co., with the

idea of replacing the present system of compressed air haulage with storage battery locomotives is being made by engineers of the company. Electric locomotives were considered for the mine some time ago, but at that time this type of haulage was not adopted.

Sullivan—The Pee Wee Coal Co. is developing a mine, and a contract for the construction of 20 houses has been awarded.

Bud—Twenty additional houses for the accommodation of company employees will be erected by the Thermo-Pocahontas Co.

Blair—The Spruce Valley Coal Co. will shortly open a new mine in the No. 5 Block seam.

Mahan—The work of developing the properties of the Eagle By-Product Coal Co. has been begun.

Clay—New Coal developments have been begun in Pleasant district of Clay County. The Hartland Coal Co., which owns more than 10,000 acres of coal land there, expects to be producing thousands of tons of coal annually in the near future.

ALABAMA

Birmingham—The Tennessee Coal, Iron and Railroad Co. has completed a modern coal washer at its Docena mines. It is of steel and concrete construction, and arrangements are being made to construct a washery plant of similar design at Edgewater, the largest coal producing operation of the company. Several hundred houses are being erected for employees at the above points and at Bayview.

KENTUCKY

Fleming—The Elk Horn Mining Corporation reports the car situation much improved; little trouble being experienced in getting all the cars it can load at the different plants. Other corporations mining in the eastern Kentucky coal fields report practically the same conditions.

Tway—The Tway Coal Co. is making increases in its plant on Martin's Fork, increasing from 20 cars daily to 25. At least two other mines will be opened within the next 60 days and other increases made.

Hazard—Since the commencement of operation of the Kentucky River Power Co.'s plant near Hazard there has been much improvement noted in the mines of this section, a large number of the plants making increases.

Whitesburg—The new town to be opened on the Day coal land tract immediately below Whitesburg on the main line of the Louisville & Nashville R.R. will be christened Bessemer. J. Henry Hall and others of this city are making the development.

Whitesburg—The town of the Elk Horn By-Products Coal Co. on Yount's Fork has been christened Parsons in honor of J. K. Parsons, manager of the plant. A regular freight station has also been thus designated by the Louisville & Nashville Railroad Co.

Coal operators throughout the Elk Horn field are generally closing long-time contracts for delivery of coal at unusually good prices—the highest ever known. Contracts are being made as a rule with iron and steel manufacturers. Those who are not making contracts are selling their product at higher prices in some instances, but indications point to considerable fluctuations from time to time.

OHIO

Steubenville—The biggest coal deal in the history of Jefferson County was recently consummated when the Wayne Coal Co., backed by New York and Pittsburgh capitalists, exercised options on 100 farms, comprising approximately 4000 acres in Knox and Island Creek townships. The average price paid was \$200 per acre. The company will engage in coal stripping operations on a large scale. Many other farms have been optioned. William Flynn, of Pittsburgh, Penn., heads the company, which is capitalized at \$7,000,000.

ILLINOIS

Carbondale—Plans are complete for beginning work on the Springfield & Carbondale interurban railroad by Apr. 1. Headquarters have been opened at Harvel. The section from Harvel to Pawnee will be constructed first. One of the biggest coal companies in the country is said to be interested in the project and the coal-carrying traffic along the line will be developed. Heavy electric locomotives will be used for coal and freight trains. C. H. Forrester of Winnipeg, is president of the company.

Pinckneyville—Eastern capitalists have options which it is said they will close within 30 days on 100,000 acres of coal lands in Perry County. The tract lies on the west side of the county, extending from the Illinois Central Ry. tracks to the Mobile & Ohio tracks. It is understood that the development of the property will be started this spring.

Gillespie—Shaft No. 4 of the Superior Coal Mining Co. is being sunk on the Joe Cahagan farm, 4 miles southwest of Gillespie. The company plans to make the mine one of the largest in the world. It will be operated entirely by electricity. There will be a double-deck hoisting apparatus and between 1500 and 1900 men will be employed. It is expected that between 7000 and 9000 tons of coal will be hoisted every

day. Inducements are being offered by surrounding towns for the company to have its employees locate there. The general superintendent will lay the propositions before the officials at Chicago. A railroad will be built to the town chosen.

Hillsboro—Coal will be taken from the Taylor Springs mine in a few days for the first time in five years. The work of restoration is about completed. The mine was found remarkably well preserved, considering the length of time that it had been idle. It will give employment to several hundred miners.

Springfield—Mining conditions in Illinois were discussed at a joint meeting of the State Mining Board and the twelve state inspectors, held at the State House a few days ago. No action was taken on legislation pending before the Assembly. Secretary James F. Morris of the State Mining Board presented the list of successful applicants for mine manager's, mine examiner's and hoisting engineer's certificates.

Kincaid—A pipe line is to be laid from the river to Mine No. 7 to supply the required water. For the past four months the company has been compelled to haul water from the river in wagons.

OKLAHOMA

Boise City—A 2-ft. bed of coal 3 ft. below the surface was recently discovered on the Will Baker ranch near here, the discovery being made when a test well for oil was started. This coal bed has been traced over several acres, and excavating machinery is being now installed to start removing it. So far as is known, this is the first bed of coal to be discovered in this section, at so shallow a depth.

Personals

David M. Caldwell of Windber, associated with the Wilmore Coal Co., is in the Windber Hospital suffering from an attack of pneumonia.

W. D. Frazier, chief clerk to the superintendent of the Baltimore & Ohio R.R. in Wheeling, W. Va., has accepted a position as traveling representative of the Pittsburgh & Ohio Coal Co.

John Pelegriano assistant labor commissioner of Kansas in charge of mine inspections has resigned his term of two years effective May 1. His successor, it is said, will be named shortly.

Leslie C. Gates has resigned his position as transitman for the Four States Coal Co. at Dorothy, W. Va., and has accepted the position of division engineer with the Tunnel Coaling Co. at Gallitzin, Penn.

Miss Neva Fitzhugh, a teacher in the schools at Watson, W. Va., upon the closing of the school year will assume the position of garden instructor under the supervision of the Welfare Department of the Consolidation Coal Co.

Robert Newcombe has resigned his position as safety inspector for the Pennsylvania Coal and Coke Corporation and accepted a position with the Pennsylvania Bituminous Mutual Insurance Co., with headquarters at Phillipsburg, Penn.

R. A. Longwell has been appointed to succeed J. H. Wilkins, resigned, as superintendent of the Dunbar plant of the Semet-Solvay company. Mr. Longwell was in charge of the Steelton plant until it was sold Feb. 1, to the Bethlehem Steel Co.

George O. Gray has been appointed manager of the Cleveland office of the Bakewell Coal Co., of Bellaire, Ohio. This company owns a mine in the Pittsburgh No. 8 district in Belmont County, Ohio, and has an output of 250,000 tons per year.

Carl Scholz, head of the mining and fuel departments of the Rock Island R.R. was married to Miss Mae A. Fleming on Mar. 8, at Chicago. Mr. and Mrs. Scholz will be at home to their friends at 700 Bittersweet Place, Chicago, after May 1.

J. H. Wilkins, superintendent of the Semet-Solvay Co.'s plant at Dunbar for the past 10 years has resigned to become general manager of the Allegheny Byproduct Coke Co. He is undecided as to where he will have permanent headquarters.

D. H. Williams, general superintendent of mines of the Continental Coal Co., one of the best known mine superintendents in Ohio, died at Glouster recently. He was superintendent of mines when the properties were operated by the Sunday Creek Coal Co.

A. B. Jessup, formerly general manager of the G. B. Markle Co. and lately interested in mines in the vicinity of Pocatello, Idaho, is completing arrangements to go to South America in the interest of the United States Government as a mining engineer, and will return to his own mines in Idaho in the early fall.

John Brown, formerly general manager of the Hillcrest Collieries, Ltd., at Hillcrest, Alberta, and more recently in charge of diamond drilling for the Canadian-Pacific Ry., Department of Natural Resources, has been appointed general manager of the Franco-Canadian Collieries, Ltd., with headquarters at Frank, Alberta.

Miss Marguerite W. Jordan, head of the welfare department of the Consolidation Coal Co., is planning for the education of the foreign residents of the mining towns in practical agricultural methods. Numerous small garden plots will be

established in each community. It is expected that this work will be well under way in a short time.

E. E. Kerwin, general superintendent of the Minneapolis & St. Louis Ry., has been appointed vice-president of the Virginian Ry. in charge of operation. James Berlingett has been promoted to general manager. The position of assistant general manager has been abolished. C. W. Huntington will be president with headquarters in New York.

W. M. Strawn, employed by the W. J. Rainey interests as assistant engineer and construction inspector for 6 years has resigned and entered partnership with F. L. James and M. B. Ellinger under the firm name of James, Ellinger & Strawn. This firm will do general contracting work, specializing on shafts. The home office is located at 633 First National Bank Bldg., Uniontown, Penn.

Everett L. Jones, for six years chief engineer for Booth & Flinn, Ltd., general contractors of Pittsburgh, Penn., has resigned to become general superintendent and chief engineer of the Pittsburgh-Hanover Coal Co., with offices in the Vandergrift Building, Pittsburgh, Penn. This is a newly organized company which intends developing large tracts of the famous Pittsburgh coal bed by stripping.

Charles P. Neill, Washington, umpire of the Anthracite Conciliation Board, has issued a ruling holding that John Sock, for seven years a miner at the G. B. Markle properties, Jeddo, should be reinstated as an employee of the company, having been discharged for leaving his work before the regular time, and which the umpire says made him the victim of "discriminatory discipline" because of his activities as a member of the grievance committee of the union.

Daniel E. Reagan has tendered his resignation as president of the Hocking Valley Products Co., effective Apr. 1, in order to devote his entire time to other business interests and to a number of patents in which he is interested. Mr. Reagan came to Columbus six years ago to take charge of the Hocking Valley Products Co., which is a reorganization of the old Columbus & Hocking Coal and Iron Co. S. L. Chamberlaine has been elected to succeed him as president. Sidney S. Schuyler was elected vice-president and Frank J. Shaffer, secretary-treasurer.

Industrial News

New York, N. Y.—The New York office of the Venton Colliery Co. has been established at No. 50 E. 42nd St.

Denver, Colo.—The Colorado Fuel and Iron Co. has closed a contract with the H. Koppers Co. for the erection of a benzol plant in connection with its coke ovens.

Eagle, W. Va.—The Kanawha Rail and River Coal Co. will start construction of ten new houses in the near future. J. F. Shearer of Eagle, W. Va., is general superintendent.

Pittsburgh, Penn.—The Wayne Coal Co., a \$7,000,000 corporation, headed by William Flynn, Pittsburgh, has bought up 4000 acres in Jefferson County, Ohio, for coal stripping operations.

Johnstown, Penn.—The Public Service Commission has directed the Pennsylvania R.R. to make a new rate to the Valley Smokeless Coal Co., and other of the coal companies in Cambria County.

Eagle, W. Va.—The St. Clair Mining Co. will start building 30 new houses about the middle of April. This firm has also completed plans for a \$28,000 tippie. F. H. Huddy is general superintendent at Boomer, W. Va.

St. Louis, Mo.—M. M. Morderwell & Co., of Chicago, will open its St. Louis office in the Railway Exchange Building on Apr. 1, with R. B. Hullhorst as southwestern sales manager to handle the products of its properties at Christopher in Franklin County, Illinois.

St. Clairsville, Ohio—The Roby Coal Co., with mines near St. Clairsville has sold 5000 acres of coal land to the C. Reiss Coal Co., Sheboygan, Wis., owner of coal docks in eight Upper Lakes cities and of a line of lake freighters to carry the coal from Ohio ports.

Charleston, W. Va.—C. E. Minor was recently awarded the contract for building 50 houses for the Bethlehem Coal Co. Forty-three of these dwellings are to be built on Helen's Run and the other seven at Shinnston. The work will be started in the near future.

Fairmont, W. Va.—At a recent meeting of stockholders of the Stafford Coal Co., that corporation was officially dissolved and its charter surrendered to the state. The mining property of the company was recently purchased by the Monongahela Valley Traction Co.

Carbondale, Ill.—The Illinois Central R.R. has recently ordered 75 locomotives, consisting of 35 freight engines, 20 switching and 20 passenger machines. The increased capacity of coal carrying equipment necessitates more motive power. The 75 locomotives cost \$3,000,000.

Cleveland, Ohio—A two-thousand-acre coal property and mine now in operation near Wheel-

ing, W. Va., has been offered for sale to the City of Cleveland by Joseph E. Robinson, Wheeling. Mr. Robinson claims the mine is producing 1000 tons per day and the price he is asking is less than \$400 per acre.

Pittsburgh, Penn.—Guards have been placed at the Arsenal grounds at 40th and Butler Sts. These grounds are occupied by the Bureau of Mines, and none but Government employees are allowed therein without a pass. Visitors are also being excluded from many manufacturing plants working on Government contracts.

Kansas City, Mo.—Coal operators in the Kansas City territory are anticipating a much larger production and marketing of coal next season than during the past year, for two reasons: They expect more cars, and better facilities for caring for any demand, and they expect the gas situation to turn more people to the use of coal for fuel.

New York, N. Y.—Thirty more of the West Virginia coal operators recently indicted for alleged violation of the Sherman law in raising the price of coal were held in \$3000 bail each in the Federal District Court on Mar. 9, after making tentative pleas of not guilty. The court granted them until Mar. 26 to withdraw their pleas.

Alton, Ill.—J. W. Hubbard, head of the Hubbard company of Pittsburgh, which recently acquired the Beall Bros. mining tool plant here, has named E. H. Beal as manager of the Alton plant and J. M. Malcolm as manager of the East Alton plant. The company will carry on the business along the same lines as it was carried on by the Bealls.

Charleston, W. Va.—It was recently announced that the Chesapeake & Ohio Railway Co. had closed a contract with the Keyser Coal Co. of Pike County, Ky., for approximately a million tons of coal for delivery during the next year as railroad fuel. The price paid is said to be \$1.25 per ton, being an advance of 25c. over the contract price of last year.

Birmingham, Ala.—The Corona Coal and Iron Co. is developing a mine in Walker County, north of Coal Valley. This development will have about ten openings, and when in full operation will produce between 2500 and 3000 tons daily. About 400 miners will be employed. The development of this mine will cost more than \$250,000, and when in full operation it will represent an investment of over \$1,000,000.

Huntington, W. Va.—It has been reported that the Pennsylvania R.R. has contracted for the entire output of the Elliott Splint Gas Coal Co. This amounts to about 100,000 tons annually. The contract is reported to run for two years, and the price paid is said to be \$2.50 per ton at the mines. It is also stated that the Pennsylvania will probably send its own cars to the mines to be loaded with coal.

Washington, D. C.—Creditors of Josiah V. Thompson, mine operator, of Uniontown, Penn., by a Supreme Court ruling on Mar. 6, may proceed to attach his extensive West Virginia coal lands for their debts. The court refused to review dismissal of a suit brought by Jacob S. Haydem, of Wheeling, W. Va., to appoint a receiver for Thompson's West Virginia property and to prevent its attachment and forced sale.

Huntington, W. Va.—Railroad embargoes had a serious effect upon the coal carrying of the Chesapeake & Ohio R.R. during February. Unofficial reports for that month show that the road carried 1,912,110 tons of coal. During the corresponding month of 1916, 2,296,815 tons were carried, and during January, 1917, 2,373,680 tons were hauled. February was the first month since April, 1915, that the railroad failed to load more than 2,000,000 tons.

Rock Springs, Wyo.—The Union-Pacific authorities recently announced that after June 1 no coal will be sold commercially from the Rock Springs district, the entire product of the mine being taken by the railroad. Twenty-five years ago Rock Springs coal was the chief fuel on the market in the West, but its sale has been gradually restricted until in recent years but little has been purchased commercially. The restriction of output to railroad fuel has been made on account of the increased requirements of the road.

Buffalo, N. Y.—The reorganization of H. K. Wick & Co., which formerly held its headquarters at Youngstown, Ohio, is announced, with Vice-President W. D. Ward promoted to the presidency. J. R. Williamson made vice-president and treasurer; George C. Zuefle, assistant treasurer and N. W. Belm, secretary. All are of Buffalo except the secretary, who was formerly the Ohio salesman of the company. He will remain at Youngstown. The company will mine and sell as jobber about 500,000 tons of coal annually. Mr. Wick died last summer, but no election has been held till now.

Cleveland, Ohio—The Tomlinson Co., Cleveland and Duluth vessel agent, has issued a bulletin covering the stocks of coal at Duluth and Superior, which says: "As near as we can ascertain, there are about 30,000 tons of anthracite coal on the docks at Duluth and Superior and about 1,000,000 tons of bituminous. The companies are husbanding both grades. Some of the coal companies are absolutely cleaned up. It may be necessary for coal consumers to use bitu-

minous coal in place of anthracite before the winter is over. The docks will certainly be cleaned at the opening of navigation."

Baltimore, Md.—The Baltimore & Ohio R.R.'s new export coal pier at Curtis Bay in Baltimore harbor, which is the largest in the world, and has a capacity of 12,000,000 tons a year, or a maximum capacity of 7000 tons of coal an hour, has been formally opened. The pier cost \$3,500,000, is of concrete and steel construction and is electrically operated. Work on the pier was commenced in February, 1916. Considering the magnitude of the work and the amount of special machinery necessary, as well as the condition of the material market, engineers consider that the improvement was constructed with remarkable facility.

Whitesburg, Ky.—The construction of a three-mile branch of the Louisville & Nashville R.R. from Kona Station, up the North Fork of the Kentucky River, will open an extensive coal field in the Whitesburg district. It is stated the Louisville & Nashville will build yards at the mouth of Colly Creek, three miles above this city, in order to facilitate coal shipments. Rumors have it that the Louisville & Nashville is contemplating double tracking the road from Whitesburg into the coal fields, a distance of about 16 miles, during this summer. In order to improve the heavy coal traffic in eastern Kentucky, especially in the Elkhorn field, the Louisville & Nashville will make many improvements, costing in the aggregate hundreds of thousands of dollars.

Harrisburg, Penn.—Judges Bechtel and Koch of the Schuylkill County court on Mar. 6 decided that the law enacted to prevent coal companies from polluting the streams of the state with culm and which provides severe penalties is unconstitutional. As a result, an indictment recently returned against the Lehigh Coal and Navigation Co. was quashed. The court declared that the title of the act gives no hint as to the real purpose of the law and that its enforcement would almost compel the coal companies to stop work. This would be a confiscation of their property and would be in contravention of their legal rights. The law referred to was the first attempt to make the washing of coal dirt into rivers a crime and was a legal novelty. Under it the Lehigh Coal and Navigation Co. as a corporation was indicted.

Wilkes-Barre, Penn.—Holding that Daniel Hoyt, the original source of defendant's title, by certificate and patent had absolute title and fee to certain lands in Kingston Township in 1801, and that the destruction of this title under the circumstances would shake the foundation of assurance to ownership of lands in the Commonwealth of Pennsylvania, Judge Fuller, decided by opinion on Mar. 8, that judgment be entered in favor of the defendant, notwithstanding the verdict in the suit of the trustees of the proprietors of Kingston against the Kingston Coal Co. The case involves title to coal valued at nearly a million dollars and is another of the famous suits by which the trustees for the original proprietors seek to recover for the public, land which was originally dedicated for the support of religion and education. The case is of such importance that nearly 80 typewritten pages of opinions were handed down expressing views of three judges.

Louisville, Ky.—Plans for a vigorous fight to force the Louisville & Nashville and the Illinois Central railroads to adjust their rates so as to permit the coal operators of the western Kentucky field to extend their markets were perfected at a recent meeting of the West Kentucky Conservation Association in the Seelbach Hotel here. J. V. Norman, attorney for the operators, who recently filed before the Interstate Commerce Commission a general complaint against these roads, outlined the basis of the fight and methods to be pursued. The association represents practically all the operators in Muhlenburg, Ohio, Webster, Union and Hopkins Counties. The complaint of the coal men is based on the rates of the two railroads, which practically restrict their market to territory between Jackson, Miss., on the south and the Ohio River on the north. This shuts off western Kentucky coal from the markets in Chicago, Indianapolis and Cincinnati, which properly belong to this field.

Johnstown, Penn.—John C. Cosgrove, head of Cosgrove & Co., coal operators, announced on Mar. 7 that his firm would place several thousand acres of ground at the disposal of the men in its employ. It will also furnish seeds and other things by which the men can plant gardens and work in a systematic campaign to lower the cost of living. The following companies will benefit through the campaign: Lenox Coal Co.; Ernest Coal Co.; Homer City Coal Co.; Neel Smokeless Coal Co.; Grazer Coal Co., and the Thermal Smokeless Coal Co. Several thousand men work at these mines. Letters have been sent to the superintendents of the various coal plants instructing them to assist the men. Mr. Cosgrove will endeavor to interest other coal operators in the movement. It is pointed out that with the car situation growing worse, the international complication and high cost of living, something of this kind will have to be done to keep the men from leaving the coal regions where they have only three or four days' work each week.

Market Department

GENERAL REVIEW

First indications of a break in the anthracite market. Bituminous also shows an easier tendency in the spot market but contract quotations are stiffer. Extraordinary high prices still rule and spring prospects have never been so encouraging.

Anthracite—The advancing season and milder weather have finally developed indications of an easier tone in the hard coal trade, particularly on the domestic sizes. Prices are a shade off, and may be expected to react down to at least the regular circular, though even under these conditions the situation will still compare very favorably with previous years at this time when the trade is usually bordering on a more or less general demoralization. The significant measures taken by the Federal Trade Commission to compel the operating interests to put in the customary April discount is one of the developments of the week. There is no appreciable surplus of coal, and dealers could dispose of substantially more than they are getting. The anthracite shipments for February show a loss as compared with the same month last year, due, in part, to there being one less working day this year, but also to labor and transportation difficulties. A very large tonnage of the steam grades has been contracted for at substantial advances over the old prices, due largely to the abnormal figures prevailing on soft coal.

Bituminous—The soft-coal situation has also eased off in sympathy with the same conditions that have affected the anthracite trade, though this applies more particularly to districts contiguous to the mining regions. Transportation difficulties, both by rail and water, have tended to maintain the recent high levels at the more remote points where arrivals are still slow; the volume of coal in these sections is still small, and emergency supplies are in demand. Even in the more favored sections deliveries on contracts continue below requirements, and it is not believed that the softening up of prices presages any general downward movement. The demand is more or less spasmodic and naturally confined to immediate needs in view of the high price level, though the market readily absorbs all the supplies coming in. Contract negotiations continue at more or less of a deadlock, both buyers and sellers showing a disposition to delay negotiations. A feature of interest in this connection is the very large amount of the anthracite steam grades that are being substituted for bituminous coal.

Ohio Valley—The withdrawal of some of the larger consumers such as the Steel Corporation, together with a notable improvement in transportation has resulted in a definitely weaker tone in the market. Transportation conditions are regarded as better than at any time for the past three months. There is no surplus, and a return of the recent freight congestion would again precipitate an acute condition, but for the time being the situation is easier. The domestic trade is still active, though lacking the stress and urgency that characterized it several weeks ago; some dealers are taking advantage of the lull to accumulate some reserves, but buying is naturally very cautious at the ruling high level. The contract market is, if anything, stiffer, \$3.50 now being the minimum on 12 months' contract in the Pittsburgh district as compared with \$3 to \$3.25 the prevailing level up to this time. Sellers are also reserved about any extensive commitments at the new level. Lake contracts in the Ohio field are being negotiated at \$3 per ton f.o.b. mines, with steam coal at \$2.50 for slack and \$2.75 for mine run.

Middle West—The market is easier as a result of the warmer weather and improved car supply; also due in part to a concerted action among consuming interests to force a decline by withholding orders and drawing on reserves which they are now less apprehensive about needing. At the same time the Western coal trade has never entered into the spring business with prices at such a high level and prospects so encouraging. An important factor is the constantly increasing demand from the head of the Lakes where supplies are being gradually exhausted. There is considerable activity in railroad contracting, the New York Central having covered some 600,000 tons of coal at \$2 per ton at the mines, and a number of other contracts being reported. There is a very definite feeling, however, among operating interests that prices will rule high in the spot market, and a number of them are refusing absolutely to consider contracts.

A Year Ago—Anthracite circulars well maintained, though market is spotty. Bituminous shows an incipient weakness. More chartering in export trade. Numerous cancellations in Middle West, and market weak.

Comparative Average Coal Prices

The following table gives the range of mine prices in car lots per gross ton (except where otherwise noted) on 12 representative bituminous coals over the past several weeks and the average price of the whole group for each week:

	Year Ago	Mar. 17	Mar. 10	Mar. 3	Feb. 24	Feb. 17
Boston						
Clearfields.....	\$1.35@1.75	\$5.90@6.75	\$5.90@7.00	\$5.60@6.50	\$5.15@6.00	\$4.85@5.50
Cambrias and Somerset.	*1.55@2.00	6.15@7.25	6.15@7.25	5.90@7.00	5.50@6.25	5.00@5.75
Pocah. and New River ¹ ..	2.80@2.85	7.00@7.25	7.00@7.25	7.00@7.25	7.00@7.25	6.75@7.00
Philadelphia						
Georges Creek (Big Vein)	2.25@2.50	6.25@6.50	6.50@7.00	6.25@6.50	5.75@6.00	5.50@5.75
W. Va. Freeport.....	1.40@1.50	5.50@5.75	6.00@6.25	5.75@6.00	4.75@5.00	4.00@4.50
Fairmont Gas mine-run..	1.40@1.50	5.50@5.75	6.25@6.50	6.25@6.50	5.25@5.50	5.00@5.25
Pittsburgh (steam coal)²						
Mine-run.....	*1.15@1.30	4.00@4.25	5.00@5.05	5.25@5.50	5.25@5.50	5.25@5.50
2-in.....	*1.25@1.40	4.00@4.25	5.00@5.05	5.25@5.50	5.25@5.50	5.25@5.50
Slack.....	*1.10@1.15	4.00@4.25	4.75@5.00	5.00@5.25	5.00@5.25	5.00@5.25
Chicago (Williamson and Franklin Co.)²						
Lump.....	*1.40@1.75	3.50@3.75	3.75@4.00	3.25@3.50	3.75@4.00	3.50@3.75
Mine-run.....	*1.25@1.40	4.00@4.25	3.50@3.75	3.00@3.25	3.50@3.75	3.50@3.75
Screenings.....	*.80@.90	2.75@3.25	3.00@3.25	2.75@3.00	3.25@3.50	3.00@3.25

Gross average³.....\$1.46@1.65 \$4.80@5.19 \$5.36@5.61 \$5.10@5.48 \$4.95@5.29 \$4.67@5.04

¹ F.o.b. Norfolk and Newport News. ² Per net ton. ³ The highest average price made last year was \$4.80@5.33 made on Nov. 25.

* Price lower than the week before.

BUSINESS OPINIONS

Iron Age—Times like these are without parallel in the iron and steel trade. Pig iron since January has been advancing in price by jumps and they have been frequently for two, three and four times the usual amounts. The advance in steel has been steady since the temporary halt in the middle of last year, but the biggest increments have been made in the last few weeks. If export demand may be seized on as substantially the main reason besides Government's needs for the later price increases, it is not yet certain that foreign buying will be checked as yet.

Dun—A certain hesitation in business, with shrinkage in its volume, is natural at this season, and there is now all the more reason for it because of present disturbing elements. Yet the volume of transactions is greater than usual at this period and the position of commerce and industry remains remarkably strong, notwithstanding the foreign complications, transportation delays, and doubts about future supplies and prices. Commercial failures this week are 255, against 337 last week, 267 the preceding week and 377 the corresponding week last year.

Bradstreet—While neither trade nor industry has lost ground the situation is marked by restraining influences, some obviously of a temporary character, but with others indicating a clear disposition to count steps before making fresh starts. Beyond cavil jobbing trade for spring account is good, and at the same time manufacturing capacity in the larger industries is overtaxed to fill orders, with car shortages still preventing anything like free movements, but a sharp line must be drawn between buying for nearby delivery, as well as between heavy orders already booked and that respecting further new buying for far-off account. In a word, high prices rather than immediate concern about our international political relations tends to produce evidences of conservatism, to check any disposition there may be to stock up for fear there may not be enough goods to go around, and to develop questions as to whether prices have not already reached the level at which consumption is likely to be checked.

Dry Goods Economist—If any merchant is doubtful as to the underlying strength of this country's financial and commercial situation at this time, he has but to note the continued firmness in prices not only of merchandise, but also of securities and of speculative commodities. Seeing that the country is now practically at war with Germany, the slight influence which this situation, serious as it is, has exerted on the markets speaks volumes for the future maintenance of trade and industry. The indications are, too, that means will be provided for the resumption of our export trade, now temporarily squelched by submarine ruthlessness.

Marshall Field & Co.—Wholesale shipments of dry goods for the current week show good gains over the corresponding periods of a year ago. Road orders for at once delivery are running about equal in volume to the period last year; road orders for future delivery are ahead of the same week a year ago. Merchants have visited the market in about equal numbers. Collections are better than in the week a year ago.

CONTRACT PRICES

Baltimore—On twelve months' contracts quotations range from \$3.50 to \$3.75, which compares with \$3.50 to \$4 quoted last week, and \$3.25 to \$3.50 quoted in our issue of Feb. 3.

Philadelphia—There has been renewed activity in anthracite contracting. Broken coal is being sold at \$4.50, an advance of \$1 as compared with a year ago. Pea coal is being covered at \$3.50 as compared with the maximum circular price of \$2.80. The high prices of bituminous has diverted considerable of this business to the anthracite buckwheat grades, on which a very large tonnage has been covered at \$3. It is likely that last year's buyers of this grade at \$1.50, will not be approached for business this season. Rice coal is being covered at \$2 as compared with \$1 on old contracts, and barley at \$1.25 as compared with 75c.

Hampton Roads—The producing interests are still backward about contracting but some few contracts have been covered at \$3 to \$3.25 per net ton, f.o.b. mine.

Washington, D. C.—In response to the request of the Navy Department for bids on 10,000 tons of coal, The Edwin M. Alden Co., of Boston, Mass., bid \$8.20 per ton for delivery at Melville, R. I., during April and May. The bid provided for six days to load and discharge with demurrage at 10c.

Pittsburgh—The contract market has stiffened up notably, the minimum now quoted being \$2.50, which compares with \$3 quoted several weeks ago. Even at the new figures operators are reserved about committing themselves, though several contracts have been closed. Particular difficulty is being experienced in fixing prices on Lake coal.

Columbus—There are rumors that an Eastern Ohio contract, involving 1,000,000 tons, has been closed. Lake contracts are being negotiated at \$3 per ton f.o.b. mines, and steam coal at \$2.50 for slack and \$2.75 for mine-run. A small city contract for 30 days was concluded at 65c., less than during the preceding two months.

Cleveland—Very few large contracts have been closed, but a number of smaller ones have been negotiated at prices ranging from \$2.50 to \$3 for Pittsburgh No. 8 coal.

Cincinnati—Miller's Creek and similar grades of mine-run are being closed for contract at \$3 per ton f.o.b. mines, with nut and slack at about the same figure. The Louisville & Nashville contract is reported as closed at \$1.75 for mine-run, at the mine, with the company placing its cars for the business.

Louisville—The Louisville & Nashville Railroad is reported to have closed contracts to supply the eastern division during the next twelve months, at \$1.75 per ton.

Birmingham—Contract consumers and operators are still experiencing difficulty in arriving at a price basis for negotiations. A contract was closed for 1000 tons of blacksmith coal at \$4.50 per net ton mines for sixty-day delivery as compared with \$1.75 on the same business last year. A deal was consummated for a fair tonnage of Big Seam washed nut at \$2.75, the customer paying \$1.30 for the same coal in the expiring contract.

Atlantic Seaboard

BOSTON

Pocahontas and New River as scarce as ever and prices unchanged. Last week's level maintained on Pennsylvania steam grades. Car-supply still ragged in all directions. Receipts of anthracite continue light.

Bituminous—The Hampton Roads situation continues very strong. Shippers are all short of coal and movement is in nowise improved. The shortage of all grades in the West is being felt on the Virginia railroads. Now that the volume of coal dumped for export is somewhat reduced on account of the international situation the operators are trying to catch up on Western orders. The demand for coke is also having its influence. Smaller agencies who a few weeks ago had spot coal to offer at regular intervals are now out of the market for weeks to come. Car movement is slow and mine output is under the same labor limitations that have prevailed for several months. Spot prices, when quoted, are still around \$7 f.o.b. Hampton Roads.

In this territory fancy prices are still being paid for spot coal, but to get the top range it must be available for immediate delivery. For prompt coal conditions here are very little less acute than a week ago. Pocahontas or New River in cargo lots would easily command \$12 alongside at this writing; \$13@14 is still asked for smaller lots for inland delivery, and such prices are paid in cases of distress. Some distributors are holding the higher grades for contract customers and for spot demand will sell only the inferior coals they have been able to pick up.

The volume of spot coal at Boston is small and consumers inland are obliged for the most part to depend on all-rail coal in transit for their emergency supplies. Car-supply is also much restricted for the short hauls. All sorts of expedients are being resorted to in order to get coal cars. Portland continues to feel the shortage more than either Boston or Providence. Points like Bangor that are ice-embargoed are much handicapped in getting fuel. Dealers and consumers alike were not able to get their accustomed quota last fall and were therefore forced to draw on Portland, as were numerous other ports usually accessible to cargo coal.

Marine transportation is now moving more regularly, however, and winter conditions cannot last. There is still a good deal of apprehension over what attitude the Government will take toward private-owned colliers on the coast. One 8000-ton boat would carry 400,000 tons a year from Norfolk to Boston.

Contract making is certainly dormant for the present. There are several large agencies who have sold only a very small proportion of the tonnage it is expected they will have.

Spot prices on the Pennsylvania grades are still pitched to a high key. The demand is somewhat less but quotations have not receded, except in scattered instances. Coal in transit all-rail is very hard to get, and car-supply is more than short.

The high prices for Tidewater coal in New England cause renewed interest in rail delivery. Consumers who have taken their supplies for years from points like Providence are now interesting themselves in Pennsylvania grades for contract.

Cambrias and the better Clearfields as well as in short supply at Philadelphia and New York loading piers. The traffic congestion at the terminals is lessening somewhat and there are those who predict much easier conditions a few weeks hence.

Bituminous at wholesale is quoted about as follows, f.o.b. loading ports at points designated, per gross ton:

	Clearfields	Camb. and Somerset
Philadelphia.....	\$7.00@ 8.00	\$7.35@ 8.25
New York.....	7.30@ 8.15	7.60@ 8.35
F.o.b. mines.....	5.90@ 6.75	6.15@ 7.25
Alongside Boston (water coal).....	11.50@ 11.75	11.75@ 12.00

Pocahontas and New River are quoted at \$7@7.25 f.o.b. Norfolk and Newport News, Va., for spot coal, and \$13@14 on cars Boston and Providence for inland delivery.

Anthracite—Receipts here are still very light. The company shippers are sending only a few barges a week and no large dealer will be able to accumulate any coal until milder weather. With very few exceptions the dealers are still buying independent coal at a premium, most of it coming by water from New York loading piers. In frantic efforts to get quick supplies during the stress period a fortnight ago there were heavy purchases all-rail which are now arriving in volume. The local situation is therefore somewhat easier.

While there is some interest in the subject of "ceiling prices," most buyers are about reconciled to no material reduction in the circular. If they could get the coal they want on the present basis they would not be disposed to complain while things are in their present shape.

The movement of boats has improved noticeably the past week. Loading is also better and several

shippers feel that gains, although slight, will be made in tonnage this month as compared with February. There is no intimation of any change in Boston retail prices.

On cars Portland, stove and egg are still quoted at \$11@11.50.

BALTIMORE

Market remains stiff, with deliveries here very light. Anthracite men still hard pressed for supplies and paying premiums. Opening of two new piers.

Bituminous—Deliveries here remain very light, due to the unprecedented rail congestion and poor movement. The demand is more or less spasmodic, as no one seems to be buying more than for immediate needs, but it is still more than sufficient to absorb the supplies that come through. That this condition will now hold until after the April contract period is over is the general belief. What will happen then is the subject of wide guessing, consumers on the one hand apparently feeling that they will be able to get more advantageous spot prices, and coal men holding the belief that the market will remain firm.

Meanwhile contract prices remain high, from \$3.50 to \$3.75 mine basis being generally demanded for April to April contracts on good coals. Few consumers seem willing to accept these terms, and in fact few operators are seeking contracts even at the figures named. Present high prices are discouraging all contract talk. At present the mine basis for coals here is about as follows per gross ton: Georges Creek Tyson, \$6.25; Somerset, South Fork and Clearfield, \$5.75 to \$6; Quemahoning, \$6; Freeport, \$5.50; Fairmont gas three-quarter, \$5.50; run-of-mine and slack, \$5.

Anthracite—Few dealers are getting anything like the amount of coal they could dispose of on late selling. There is little contracting talk, as the dealers are all up in the air concerning the question of a spring schedule. It is the most unsettled March in the history of the trade here. Premiums are being generally paid for coal that is badly needed to meet pressing obligations.

NEW YORK

Anthracite shows signs of lower prices for independent coals. Buckwheats decline but producers show no indications of haste in closing contracts. Large tonnages of bituminous moving and prices are easier.

Anthracite—The market is easier and buying is almost dependent upon weather conditions. Demand is quiet and buyers are playing a waiting game while sellers are becoming more active. Retailers are apparently determined not to have any high-priced coal on hand at the end of the month irrespective of whether a new schedule is announced or not.

Although demand is quiet independent operators are still able to command a premium of about \$1 a ton for domestic sizes. The companies cannot give their customers full requirements. Stocks at Tidewater have not increased. Quotations for all sizes of independent coals are lower and it is the prediction that premium coal will soon be out of the market. With the reduced demand at the New York Tidewater independents are diverting their product in other directions where the demand is greater. Some middle houses had very little coal to offer the first of the week.

There is no trouble in loading at the docks when the boats are ready but boatmen are holding out, in some cases, for higher rates. Loaded boats bring better prices than for the same coal still at the docks.

Some small steam tonnages have been signed up at the new contract prices, but more have been turned down. One order aggregating about 60,000 tons of buckwheat No. 1 was refused because of the uncertain conditions prevailing.

Pending the announcement of a new schedule by the anthracite operators bids will be asked for by the city for one month's supply of coal for various of the city departments. This coal is to be delivered during the month of April and the bids will be opened on or about Mar. 25.

The bids for eleven months' supply will be opened on or about Apr. 10. The tonnage requirements for this proposal have not yet been prepared but it is known that the Docks and Ferries Department will need at least 93,000 tons of buckwheat No. 2 for use on the ferryboats.

Current quotations, per gross ton, f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken.....	\$4.95	
Egg.....	5.45	\$6.50@7.00
Stove.....	5.70	6.50@7.00
Nut.....	5.75	6.50@7.00
Pea.....	4.00	5.25@5.50
Buck.....	2.75	4.75@5.25
Rice.....	2.20	4.00@4.50
Barley.....	1.95	3.25@3.50
Boiler.....	2.20	

Quotations at the upper ports are generally 5c. higher.

Bituminous—Decreased demand has not increased the stocks at the New York Tidewater. Buying has slowed down but with car supply far below normal shippers are not having any trouble in taking care of their surplus coal. Large con-

sumers covered by contracts are not getting their full requirements and many industrial plants on Long Island are running short of coal.

The mine workers in the Barnesboro and Clearfield districts are dissatisfied with the present working agreement and threatening to make new demands. The dissatisfaction is said to have gone so far as to include their withdrawal from the miners' union and the formation of a new organization to force their demands.

Operators along the Pennsylvania road received about 30 per cent. of their car requirements the first of the week, while those along the Baltimore & Ohio managed to get about 60 per cent.

The railroads are taking large tonnages. Producers are going slow about closing contracts even at the high prices announced several weeks ago. Ocean shipping is slow, which causes a dull bunker coal market.

Shippers with loaded boats have been known to dispose of them at lower prices than obtain at the docks, to save demurrage charges.

A formal bid received by one of the city departments this week for more than 5000 tons of bituminous coal named a price of \$5.69 per net ton; an informal bid received at the same time was for \$5.58 per net ton.

Current quotations, per gross ton, f.o.b. Tidewater, for various grades are as follows:

	Port Reading	South Amboy	Mine Price
George Crk.			
Big Vein..	\$7.25@7.50	\$7.25@7.50	\$5.25@5.50
Tyson...	7.25@7.50	7.25@7.50	5.25@5.50
Clearfield..	6.75@7.25	6.75@7.25	5.25@5.50
South Frk..	7.00@7.25	7.00@7.25	5.25@5.50
Nanty Glo..	7.00@7.25	7.00@7.25	5.25@5.50
Som'r. Co..	6.75@7.00	6.75@7.00	5.00@5.25
Que'ho'ing..	7.00@7.25	7.00@7.25	5.25@5.50
W. V. Farm't			
Th'r'qua...	6.50@6.75	6.50@6.75	4.75@5.00
Mine-run...	6.50@6.75	6.50@6.75	4.75@5.00
West. Md..	6.50@6.75	6.50@6.75	4.75@5.00

PHILADELPHIA

Anthracite shows signs of easing off with some holding of orders. Reduced premium prices. Pea continues scarce. Steam and manufacturing sizes under contract. Bituminous declines 25c. to 75c. Big buyers out of market. Slack coal in heavy demand.

Anthracite—Unmistakable signs of weakness features the present market, particularly on the prepared sizes; this is due to the lateness of the season and to the extremely mild weather. Cancellations or holding of orders are by no means rare. Quite a number of dealers have more stove on hand than they felt they would be able to dispose of. Most of the dealers are anxious to take all the chestnut they can get and stove was also still in demand but not nearly so active as during the past few weeks. The high-price market suffered and individuals who were selling egg, stove and chestnut a week or two ago at \$6 and \$6.25 welcomed orders at \$1 per ton less. There is now a prospect of their looking for business at circular rates within a week.

Pea coal shows no signs of falling off. Many dealers have none on hand and there has been much substituting of chestnut—at the increased price, of course. For a few days last week the large suburban sections of Germantown and Chestnut Hill were entirely bare of pea coal. West Philadelphia was also in very short supply and premiums of from 40c. to 50c. were cheerfully paid while the rates to outside points are much higher.

The tonnage shipped into this market by the largest company during the past three weeks has been enormous. Conditions were such that it was possible for them to carry the market along almost alone.

Speculation as to the new spring prices continues to be the live topic of the trade. Practically all the shippers have let it be known that it would not be surprising if there were no reduction Apr. 1. This has prepared the dealers to feel out public opinion and may influence continuous buying throughout March. Now if prices are increased by eliminating the usual discount on top of the reduction in freight rates, there is sure to be a storm of criticism. The big operators have never convinced the public that the mining companies are divorced from the coal roads, and are sure to be accused of squaring accounts by increasing the price of coal to cover the reduction in freights.

Contracts for broken are being closed at \$4.50 on business that brought \$1 less a year ago. We understand that some are willing to close contracts on pea coal at \$3.50, the maximum circular price for which at this time is \$2.80. On buckwheat there are innumerable small concerns whose business was sought last year at \$1.50 who will not be approached at all this year because some of the largest industrial plants have closed for an immense tonnage at \$3. Secure in their belief that the price cannot recede to last year's level, the operators show a disposition to keep some free buckwheat. Rice coal is being taken at \$2 as compared with \$1 a year ago, while barley that brought 75c. is now being closed at \$1.25. The largest company whose contract rates are always considered the "standard" has not as yet announced prices, but these figures are on large tonnages.

The individual operators' association has held a private meeting at which the question of chang-

ing the sizes of prepared coal to "range" and "heater" was strongly agitated, but after the fiasco of last spring it is doubtful if any decided action will be made. The matter of spring prices was also taken up, but no information was given out on this point.

All the dealers have this winter set such a high standard for prompt payment of their coal bills that many will find it difficult to regain their old positions on the 60 to 90 days basis with their shippers.

Prices per gross ton f.o.b. mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken.....	\$4.25	\$5.40	Buck.....	\$2.50	\$3.40
Egg.....	4.15	5.25	Rice.....	2.10	3.00
Stove.....	4.10	5.60	Boiler.....	1.95	3.15
Nut.....	4.50	5.55	Barley.....	1.85	2.05
Pea.....	2.80	3.70			

Bituminous—Prices have eased off all around the last few days. On the better Pennsylvania coals this decline was from 25c. to 50c., while some of the Fairmont grades showed changes of as much as 75c. There seems to be no particular explanation for this recession, under existing conditions, and no one is willing to admit that this presages the beginning of another downward movement; however, past experience this winter has been that when the \$7 mark has been touched it has invariably been followed by a moderate decline. The present slowing up may be attributed to the fact that the heavy buyers have dropped out of the market for the time being, but their return may be expected any moment. Another factor is that some of the largest industrial concerns have been contracting heavily for the anthracite steam sizes of late, which at a price of \$3 for No. 1 buckwheat makes it a good purchase for the consumer when compared to the contract offerings on soft coal. These arrangements have been made very quietly during the past month or six weeks and are going to displace a considerable quantity of bituminous.

The car supply continues anything but good and the railroads are as badly congested now as they have been any time since the first of the year. Considerable dissatisfaction is heard from those shippers who do not have railroad fuel contracts and who are being deprived of their quota of cars, on this account.

The prices per gross ton f.o.b. cars at mines are as follows:

Georges Creek Big Vein.....	\$6.25@6.50
South Fork Miller Vein.....	6.25@6.50
Clefield (ordinary).....	6.00@6.25
Somerset (ordinary).....	6.00@6.25
West Va. Freeport.....	5.50@5.75
Fairmont gas lump.....	6.00@6.25
Fairmont gas, mine-run.....	5.50@5.75
Fairmont gas, slack.....	5.25@5.50
Fairmont lump, ordinary.....	5.25@5.50
Fairmont mine-run.....	5.25@5.50
Fairmont slack.....	5.25@5.50

HAMPTON ROADS

Exports heavy. Coastwise movement good. Good shipping in loading. Contracting at minimum. Prices firm.

No figures are now available for export shipments, but the movement of this class of business is probably heavier than for several months. The large number of American vessels engaged in this trade is noticeable, also the number of square riggers. Foreign freights are still high and bottoms scarce. There was a partial strike at the Lamberts Point piers of the Norfolk & Western Ry. several days ago, but it was of short duration and the delay to vessels was insignificant.

Shipment on coastwise business is in fair volume, being carried principally by steamers and barges; schooners, once so numerous in this trade, are largely engaged in offshore charters. The Panama colliers "Cristobal" and "Ulysses" are now loading and the "Achilles" is expected to arrive shortly. The two latter steamers are kept constantly on the run between Hampton Roads and Cristobal. With the recent good weather there has been excellent dispatch given vessels at the various piers, being in line with the well-earned reputation of these terminals.

The Cuban consul here announces that the port of Santiago, which has been closed on account of the revolution, is now open. Several steamers with cargo for Santiago were obliged to clear for other ports.

It is reported that the mail steamers "Bergensfjord" and "Christiansfjord" are shortly to load coal in America for Norway. These steamers, owned by the Norwegian-American Line, are on the passenger run between New York and Norway. The decision to abandon the passenger business for at least one voyage is no doubt due to the shortage of fuel in Norway.

Suppliers are still backward about contracting, though some few contracts have been closed at from \$3 to \$3.25 per net ton f.o.b. mines. With the labor and car supply uncertain for some time to come shippers are not anxious to obligate themselves for more tonnage than they can deliver. Prices are firm as follows: Pocahontas and New River run-of-mine for shipment coastwise and foreign around \$7; for bunker delivery \$7.50 plus 15c. per ton trimming; on track for

local consumption \$6.50 per net ton; anthracite \$9 per net ton delivered.

Dumpings at the Hampton Roads piers for the past several weeks were as follows:

	Feb. 17	Feb. 24	Mar. 3	Mar. 10
Nor. & West.....	114,832	127,765	100,118	112,618
Ches. & Ohio.....	130,752	125,089	122,483	94,423
Virginian.....	77,158	69,014	127,902	77,982
Total.....	322,742	321,868	350,503	284,023

Ocean Shipping

OCEAN FREIGHTS

Since our last report a number of steamers were chartered for export coal at \$20 per ton net to Rio, \$10 per ton to the Windward Islands and \$8.50 per ton, charterers paying foreign port charges to Curacao. The market is even firmer than a week ago but chartering is more active than it was then.

We would quote freight rates on coal by steamer as follows:

	Mar. 5	Mar. 12
Europe		
West Coast Italy.....	\$56.40@62.40	\$50.40@57.60
Marseilles.....	54.00@58.80	50.40@55.20
Barcelona*.....	26.40@28.80	22.80@27.60
South America		
Montevideo.....	23.40 about	24.00 about
Buenos Aires.....	23.40 about	24.00 about
Rosario.....	25.20@26.40	25.20@26.40
Rio Janeiro.....	20.00 about	20.00 about
Santos.....	20.00 about	21.00 about
Chile (good port).....	14.00@16.00	15.00@16.00
West Indies		
Havana.....	4.75 about	4.75@5.00
Cardenas, Sagua.....	7.00 about	7.00 about
Cienfuegos.....	7.50 about	7.50 about
Port au Spain.....	10.00 about	10.00 about
St. Lucia.....	10.00 about	10.00 about
St. Thomas.....	8.00@9.00	8.00@9.00
Barbados.....	10.00 about	10.00 about
Kingston.....	7.50 about	7.50 about
Curacao.....	9.00 about	8.50 about
Santiago.....	6.75 about	7.50 about
Guantanamo.....	6.75 about	7.50 about
Bermuda.....	7.00@8.00	7.00@8.00
Mexico		
Vera Cruz.....	8.50@9.00	8.50@9.00
Tampico.....	8.50@9.00	8.50@9.00

* Spanish dues for account of cargo. ¹ And p.e.

² Or other good Spanish port. ³ Net.

Note—Charters for Italy, France and Spain read: "Lay days to commence on steamer's arrival at or off port of discharge."

W. W. Battie & Co.'s Coal Trade Freight Report.

COASTWISE FREIGHTS

Freights on such boats as are available, regardless of size, are apparently on a firm basis of \$4, Hampton Roads to Boston; \$3.50 is the corresponding rate to Providence and other ports on Long Island Sound. Few bottoms are offering, and those are mostly small barges.

One dollar and ninety cents to two dollars is the range from New York to Boston, and \$1.35@1.50 to New Bedford and similar ports. There is a fair supply of barges for this service, but rather few shippers have the coal available to load.

Ohio Valley

PITTSBURGH

Car supplies materially improved. Spot market decidedly lower. Contract demand good at the stiff price of \$3.50.

The heavy snowfall of last Sunday week did not stiffen the spot coal market as much as might have been expected, or indeed was expected by many sellers. Day by day last week the stiffening was looked for, but the recovery of the railroads was so rapid that there was scarcely an upturn. By the end of the week the trend was distinctly downward and this week prices are decidedly lower all around. The whole traffic situation is better than it has been at any time for three months or thereabouts, and while it is still very bad the trend is in the right direction. A part of the decline in prices, however, is attributed directly to the influence of the Steel Corporation and two or three other large buyers withdrawing from the spot market a trifle more than a fortnight ago. The spot market is now 75c. to \$1 lower than at the time of our last report.

The contract coal market has not weakened but if anything has grown stronger. There are no sellers on contract at as low prices as a fortnight ago, and so far as can be learned the minimum quoted on steam mine-run for the twelvemonth beginning Apr. 1 is \$3.50. As reported several weeks ago there was a little renewing done at \$3, by operators who would have quoted \$3.25 at least on new inquiry. It is claimed that many consumers are anxious to contract at \$3.50 but that the closing of contracts is retarded by the reserve of sellers. Several contracts have been made at \$3.50. There has

been particular difficulty in arriving at satisfactory closing prices for Lake coal, and in several cases the difficulty has been bridged by the making of arrangements whereby the seller obligates himself to furnish the tonnage, over the Lake season, at a price to be arranged later, but guaranteed to be as low as the seller makes to other buyers.

We quote spot coal at \$4@4.25 for slack, \$4@4.25 for steam mine-run and \$4.25@4.50 for 4-in. gas and \$3.50 for steam mine-run on contract for the year beginning Apr. 1, all per net ton at mine, Pittsburgh district.

BUFFALO

Situation not cleared up yet. Coal is moving a little better, but up till now the shortage has been increasing. Mild weather will soon relieve anthracite stringency.

Bituminous—The movement of cars is easier, but the shortage occasioned by the former snow conditions has not yet been overcome. Factories have not shut down to any great extent, but the demand for power is increasing and plants using Niagara water power are getting hold of extra steam power to assist at peak hours of the day. There was no report last week of price weakness, as was the case during the previous week. Pittsburgh has all along held firm, but some other districts a while ago showed evidence of weakness.

Complaints of the slow movement of cars continue. Apparently nothing but the disappearance of the snow saved the situation and prevented a panic. It now remains to see if the roads can keep ahead of the consumption with no frost conditions to hinder.

Contract prices have about settled down to \$3 net for all annual contracts. The amount being tied up now is not large, as the operators and jobbers are afraid of complications. Price fluctuations made so much difficulty the present contract year that it is not safe to contract as much as formerly. Some sellers are still refusing to make any contracts. It is common for specifications from public institutions to appear at this time, but so far none have been given out.

A little consignment coal has appeared now and then lately and if the April contracts are not renewed, as now seems likely, the free coal at the mines will soon be quite considerable. Jobbers report a slight weakness of prices this week and advise quotations as follows:

Youghiogheny Gas.....	\$6.00@6.50
Pittsburgh Steam.....	5.75@6.25
Ohio No. 8.....	5.75@6.25
Allegheny Valley.....	5.50@6.00
Cambria Co. Smithing.....	5.70@6.20
Pennsylvania Smokeless.....	5.65@6.15
All Slack.....	5.25@5.75
Cannel.....	5.90@6.00

Anthracite—The return of open weather has lessened the demand here, though outlying districts have been so short for a long time that they still need considerable coal to make them feel safe. The idea is general that there will be no April reduction, for it is believed that the demand will exceed the supply for months yet. A lull must set in soon, for nobody will buy coal to store till next month's prices are known.

There is considerable buying in small amounts on account of extra burning during the cold weather.

Reports from the upper-lake district show some weakening of bituminous prices, but so little anthracite is on hand that there will be an effort to obtain an early supply by Lake although it will be sometime before any can be loaded here. If any is ready to go with the first spring fleet it will have to be taken from the supply that is needed locally and in the rail-line trade.

DETROIT

Steam plants requirements leave almost no free coal. Domestic buying eases off. Lake shippers expect busy season.

Bituminous—Steady consumption of coal by Detroit industrial and manufacturing plants appears to absorb practically all stock coming into the market. Though some of the jobbers report a little freer movement, they say nearly all the coal is sold either before it leaves the mines or while in transit and that there is virtually no free coal to be had. This situation gives little uneasiness, but should freight congestion or other causes materially cut down the volume of receipts, some of the steam plants might be left with very short supplies. The consumers of steam coal being unable to obtain their requirements of small sizes are accepting almost anything to be had in the way of coal.

Regardless of origin, lump and egg coal is bringing the equivalent of about \$4.75 at the mines. The same quotation applies also on sales of slack, while mine-run is quoted at \$4.50 at the mines. Pocahontas egg size is selling at \$5 at the mines. Moderate temperatures have caused a lighter demand for domestic coal. The season has now advanced to a point where the retail dealers do not care to make any material additions to stocks.

Anthracite—In the anthracite trade a somewhat similar condition prevails. Retail dealers are holding off on orders in expectation of the usual reduction in price Apr. 1. There is con-

siderable uncertainty as to whether a discount will be made. Deliveries are slow, weeks often being required to get cars from Eastern mines to Detroit and Michigan destinations.

Lake Trade—With docks at the head of the Lakes well cleared of coal, shippers are expecting an active season in the Lake trade. There are several uncertainties, among them the difficulty in getting vessel capacity and the uncertainty as to what increased demand may develop in the East.

COLUMBUS

The steam trade is now the chief feature of the business. Prices at the mines have declined, while retail quotations are unchanged.

The steam trade is the best feature of the coal business. Buying on the part of larger users is active. With the railroad congestion relieved to a certain extent, shipments are coming along better and this is enabling large consumers to accumulate a small surplus.

The domestic trade is still active but the stress of several weeks ago has passed away. Some of the dealers are taking advantage of the lull to accumulate stocks for the cold snaps which usually occur during March and early April. Retail trade is only fair. There is a good demand for Pocahontas and also for West Virginia splints and smokeless varieties. Retailers are looking forward to a brisk stocking season, much earlier than usual and many are making preparations accordingly.

The production in Ohio fields has been increased during the past week under the influence of a better car supply, especially in the Hocking Valley. Eastern Ohio is still hampered by lack of cars and the same condition prevails in the Pomeroy Bend field. Cambridge and Massillon have also increased their weekly output to a marked extent.

More activity has developed in steam contracting. Unofficial word has been received that one large producer, located in the eastern Ohio field has contracted for approximately 1,000,000 tons for 1917, mostly for the large trade. The Lake coal is sold at \$3 per ton, f.o.b. mines. Steam coal is sold at \$2.50 for slack and \$2.75 for mine-run. Quite a few inquiries have been received from railroads but so far no contracts have been signed up. The Columbus board of purchase has awarded the contract for the city coal supply during the month of March to the Gem City Coal Co., at \$4 per ton, which is 65c. per ton less than the price paid by the city for the months of January and February.

The outlook for the Lake trade is bright and already quite a few shippers have contracted for tonnage to be moved to the head of the Lakes. Lake prices will show a big advance over last year and rates on boats will also be advanced. Reports indicate that there will be a great demand from all of the docks.

Prices on short tons, f.o.b. mines are as follows:

	Hock- ing	Pom- eroy	Eastern Ohio
Rescreened lump.....	\$4.00	\$4.00	
Inch and a quarter.....	4.00	4.00	\$4.00
Three-quarter inch.....	3.75	4.00	3.75
Nut.....	3.75	3.75	3.75
Egg.....	3.50	3.75	
Mine run.....	3.50	3.50	3.50
Nut, pea and slack.....	3.00	3.25	3.25
Coarse slack.....	3.00	3.25	3.25

CLEVELAND

Movement better and prices are easier.

Several days of mild weather has served to give the railroads a chance to increase the movement of coal from the mining districts and this has caused a drop in local market prices. While the car supply at the mines has not improved to any noticeable extent, the railroads have been bringing in coal which was loaded from ten to thirty days ago, and this has softened Cleveland prices as well as affected prices for shipments from the mines.

To date, very few contracts for large tonnages have been reported, but a few small contracts for Pittsburgh Number Eight coal have been closed at prices ranging from \$2.50 to \$3 net ton f.o.b. cars the mines.

Following are the market prices per short ton, f.o.b. Cleveland:

	Three- quarter	Mine-run	Slack
No. 8.....	\$4.75	\$4.75	\$4.75
Cambridge.....	4.75	4.75	4.75
Middle Dist.....	4.75	4.75	4.75
Hocking.....	4.25	4.25	4.25
Pocahontas.....		5.50	

CINCINNATI

Mild weather has caused the domestic market to ease off, but the steam market is still strong and active. Contracting is proceeding slowly, operators being reluctant to close.

A week of mild weather has restricted the demand for coal for domestic use and dealers are now trying to get through the remainder of the season on what coal they have. The strong and active steam market continues, however, with every indication of being maintained for some time to come.

Transportation conditions remain very bad, the car supply being poor, and the railroads being hampered by slides and washouts caused by heavy rains and melting snow. Congestion at Cincin-

nati and other terminals has been somewhat relieved, removing one factor in the fuel shortage but the others remain.

The pressure of large steam consumers for contracts is increasing, but operators are still reluctant to close under existing conditions, and such contracts as are closed are at very high prices, such as \$3 for mine-run of the better grades, and even higher for nut and slack. Spot screenings of the good grades are quoted at \$3.75@4.

LOUISVILLE

Kentucky market easier due to better car supply and milder weather. Shortage of labor reducing output.

An easier feeling obtains in the Kentucky market, with prices showing a reduction of about a dollar, compared with the high levels of the past several months. Milder weather is relieving the demand for domestic sizes, consumers and retailers postponing purchases in expectation of lower prices. Better car supplies are the rule, and there are also numerous reports of a shortage of labor.

Prices, f.o.b. the mines for Southeastern Kentucky coal are quoted: Block, \$3.75@4; mine-run, \$3.50; nut and slack, \$3.75@4. Western Kentucky, lump, \$2.50; mine-run, \$1.75@2; nut and slack, \$2.

Contracts have been made between the Hazard Coal Operators' Exchange and the Louisville & Nashville for the railroad's annual supply for the Eastern Division, at \$1.75 a ton.

BIRMINGHAM, ALA.

Buying movement active, with prices holding up to high levels. Mines seriously crippled in production by failure to receive sufficient cars for loading.

Inquiries have shown a perceptible increase this week and a strong, stiff spot market has been maintained. Stocks are exceedingly short and inadequate to meet requirements. Several railroads were in the market for supplemental fuel supply, one line buying a hundred cars of medium grade mine-run at \$2 per net ton mines, while another closed for a like number of cars of higher grade mine-run at \$3 mines. Several industrial interests sought to place contracts, but prices stipulated by the producers proved a temporary stumbling block. Sales of fifty and one hundred cars of mine-run coal at \$3 to \$3.50 per ton mines were numerous.

A contract was renewed for Big Seam washed nut at \$2.75 per net ton mines as against \$1.30 per ton paid by the consumer last year. Blacksmith coal is in good demand but very scarce.

A contract was closed for 1000 tons for two-months' delivery at \$4.50 per ton mines. Spot quotations are as follows per short ton mines for mine-run: Big Seam, \$2.50@3; Carbon Hill, \$2.75@3; Cahaba, \$3.25@3.50; Black Creek and Pratt, \$3.25@3.50. Washed nut, \$2.75@3.25. Domestic prices range from \$3 to \$4.25 per ton mines, with slight demand.

Coke

CONNELLSVILLE

Spot prices down further. Considerable contracting for foundry coke, with prices now higher. Car supplies better.

The spot coke market began to decline again, late last week, owing to the railroads recovering rapidly from the effects of the heavy snowfall. Receipts at furnaces late last week were not overly good, but shipments were better, and this week opened with the best car supplies for many weeks. Demand for both furnace and foundry coke for spot shipment has been relatively light, and further declines are not improbable. We note a sale of 1000 tons of very good grade furnace coke for spot shipment to the East at \$10, fairly typical of the market early in the week.

Sellers of foundry coke have become very reserved about making contracts for the second half, several having withdrawn quotations altogether, while others are quoting not under \$7.50. This follows the booking of a few contracts at \$6.50 and a larger number at \$7. There were three regular sellers, while a few others accepted contracts at \$6.50 or \$7, when they saw there was danger of regular customers getting away from them. With the higher prices now quoted consumers are not so much interested. No market price has been established on second half furnace coke. Some operators are talking \$8, but consumers have shown no interest, at least at such a price.

We quote: Spot furnace, \$10@10.50; spot foundry, \$10.50@11; contract furnace, \$7@8; contract foundry, \$7@8.50 per net ton at ovens.

The "Courier" reports production in the Connelleville and lower Connelleville region in the week ended Mar. 3, at 346,463 tons, a decrease of 6998 tons, and shipments at 342,730 tons, a decrease of 10,355 tons.

Buffalo—Prices are as firm as ever, for the supply has not increased fast enough to provide consumers with any stock and they are still afraid that some special condition will again cut the supply down to nothing. Most consumers would pay still more than the present supply rather than shut down, though figures are for

the most part still at the upper limit of \$11 at the ovens, or \$12.85 here for all grades, as the supply is not large enough to admit of variation.

Chicago—Spot prices for free coke still continue high, with only a limited supply offered. Furnace coke is in strong demand, and by-product sizes show a slight tendency to become easier. Gas house is very active. Chicago prices average from \$10 to \$13 per ton.

Birmingham—Coke producers are facing a heavy demand, with a supply inadequate to meet it. Prices have made another advance this week, spot foundry being firm at \$12.50 ovens, with \$10 per ton contract basis, though trades have been closed at \$11 and \$11.50 per net ton ovens, with contract consumers. Furnace coke is quoted at \$7.50 per net ton ovens, though there is practically none to be had at any figure. Two of the largest coke producers are reported out of the market for sixty days.

Middle Western

GENERAL REVIEW

Western coals generally strong. Car supply 40% of requirements. Smokeless contracting brisk. Eastern grades scarce.

Firmness of prices for all grades at this time, when there is usually a marked slump in demand, is the outstanding feature of trade. Milder weather has caused some easing up in prices of lower grades, but high grades maintain a strong position. Never in the history of the Western coal trade have prices been so high at the spring season nor the prospects so good for a summer of record-breaking prices.

Quotations are about on the same level as last week, although screenings are occasionally somewhat easier. Car supply is worse, and Indiana and Illinois mines have had about 40% requirements.

Increased demands are coming in from the Northwest, which is growing to large proportions, as the supply on the docks becomes exhausted. It is very likely that the dock season this year will wind up with every pound of hard and soft coal cleaned up before the opening of navigation. Reports of the Weather Bureau show that the ice on the Lakes is from two to eleven inches thicker than the average for the last ten years and the opening of navigation may be delayed considerably beyond the usual time. Shippers are not meeting with much success in obtaining bottoms.

Both consumers and retailers are showing more of a disposition to buy on a hand-to-mouth basis owing to weather uncertainties, but the almost total dearth of any spot Eastern bituminous coal is causing a very steady demand for coarse Western grades.

The contracting situation is unchanged, but it is well established that a number of large consumers have covered themselves on western coals at prices from 75c. to \$1 higher than last year. A number of Illinois operators have flatly refused to take any contracts at all. Railroad contracting is now one of the big features, and it is expected before the close of March these contracts will all have been negotiated; 600,000 tons of Saline County coal was contracted for by the New York Central Lines this week at \$2 per ton at the mines. Retailers have evinced a disposition to close up contracts for smokeless coal this week, and it is reported they have obligated themselves to take a larger summer tonnage than ever before.

ST. LOUIS

Warmer weather and easier car conditions bring a declining market. Demand lighter on all grades. No anthracite shipments, and smokeless arrivals small.

There has been a falling off in the demand for everything, both locally and from the country. Continued warm weather and a better car supply is the principal cause; big buyers are also no longer afraid of a coal shortage and are using up surplus stocks, feeling that by laying off buying it will bring about lower prices in the next few weeks. The railroads have also practically gone out of the market for the present.

Indications are that Standard 2-in. lump will go perhaps as low as \$1.25, and screenings about the same, with 6-in. at \$1.50. This will probably be the minimum of the market this spring.

Coal from this field is a drag on the market at this time and it has a tendency to demoralize the business in other districts. The Mt. Olive district is not shipping much coal in here, most of this still going to Chicago and the north with some shipments to Indiana and Michigan points. There is a good demand from the Indiana and Eastern points for this grade of coal, as well as for Williamson and Franklin County. In the latter districts the northern market still continues fairly active, but locally it has gone to pieces.

No anthracite shipments are coming in, and there is practically no demand from this time on for anthracite coal. The same applies in a way to smokeless, although there is some demand which will continue if the price permits of its shipment here.

There has been a fairly good tonnage of smithing moving through the last week or two at a price of about \$7.25 to \$7.50 f.o.b. St. Louis on West Virginia New River.

The car supply was considerably better on most roads this week. The Illinois Central gave between 50 and 60 per cent., the Louisville & Nashville about 66 per cent. (with restrictions), Baltimore & Ohio 75 per cent., Missouri & Ohio 35 per cent., Southern 40 per cent., Vandalia about 80 per cent., Wabash about 80 percent. On the short line coal roads the supply was about 90 per cent. In the high-grade field the Chicago, Burlington & Quincy lead with about 70 per cent, the Chicago & East Illinois with about 65 per cent., the Illinois Central around 50 per cent., and the Iron Mountain the same.

A few operators in the Standard field are entertaining contracts but others will not even bid on them. There seems to be a feeling that the open market prices for the greater portion of the coming year will exceed anything in the way of contract prices that might look reasonable at this time to the buyer.

In the Standard field one contract has been closed for five cars of 2-in. lump per week at \$1.32½¢. The mine. Some of the Standard operators are asking as high as \$1.75 for 2-in. screenings, Mt. Olive district shipments, but nothing has been closed at these figures. A few small Standard lump contracts have been closed at about \$1.30 to \$1.35 the mine, but the tonnage is very light.

On Du Quoin one contract has been made for 100 to 125 tons per week of 2-in. screenings at \$2 the mine from Mar. 1, 1917, to Apr. 1, 1918. In the Williamson and Franklin County field a contract for 10,000 tons of 1½-in. Williamson County screenings, equal monthly shipments, to the Minneapolis market, was closed at \$1.85 the mine. Contract prices on 2-in. screenings and mine-run from this field, continue at about \$2 the mine. In the Murphysboro Big Muddy field a contract was made for six cars per month of 2½ in. lump for one year at \$3 to Aug. 1 and \$3.25 after that. This is for gas producers.

Current prices range about as follows per net ton at the mine:

	Williamson and Franklin Co.	Mt. Olive and Staunton	Standard
6-in. lump...	\$2.75@3.00	\$2.25@2.50	\$1.50@1.75
3x6-in. egg...	2.75@3.00	2.25@2.50	1.50@1.60
2x3-in. nut...	2.75@3.00	2.25@2.50	1.50@1.60
No. 2 nut...	2.75@3.00	2.25	1.50@1.60
No. 3 nut...	2.75@3.00		
No. 4 nut...	2.75		
No. 5 nut...	2.40		
2-in. screen...	2.50	1.65	1.40@1.50
2-in. lump...			1.40@1.60
3-in. lump...			
Steam egg...			1.40@1.50
Mine run...	2.50@2.75	1.75	1.25@1.35
Washed			
No. 1...	3.00	2.50	
No. 2...	2.75@3.00	2.25	
No. 3...	2.75@3.00		
No. 4...	2.75@3.00		
No. 5...	2.40		

Rate on Williamson and Franklin Co. is 72½¢.
Rate on other fields is 57½¢.

CHICAGO

Lack of cars tightens the spot market. Railroad movement still very slow. Steam demand strong with no easing in call for domestic sizes.

The Franklin County mines have averaged about 75% running time during the last three weeks. February output of this field was 989,000 tons which was 72,000 tons less than the same month of last year. Calls for southern Illinois coal are reaching the operators from new territory, and this tends to keep prices very firm. Car supply at Williamson County mines improved somewhat during the week.

The central Illinois field has had a steady demand for production of all sizes this week, and is still shipping a considerable tonnage to Eastern territory never before supplied from that district. Prices are on about the same level as last week. Central Illinois operators are asking very stiff prices on new contracts. The domestic demand in the Peoria district and adjoining mines has declined somewhat owing to warmer weather; calls for steam coal, however, continue just as pressing as ever.

Indiana coal is moving very slowly to Chicago, and demands for production from Western Ohio, Michigan and Indiana cities has lessened the amount of tonnage consigned to Chicago, with the consequence that prices during the middle of the week became stronger. The demand for steam coal from Indiana mines is increasing at home. The order of the Indiana Utilities Commission giving coal the right of way over all other freight in the state has helped to relieve the shortage, but previous conditions have not changed greatly.

The spot smokeless market is firm, and every available shipment is instantly sold. Pennsylvania smokeless shipments have been light, the tonnage being confined to a few box cars of mine-run. Chicago retailers have been busy this week signing up contracts for smokeless production at the higher figures. No Hocking arrivals are reported this week, and splint shipments have been light due to car shortages. Kentucky block is not very plentiful, and prices show practically no change.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Springfield	Fulton & Peoria Cos.	Clinton & Sullivan Cos.	Green & Knox Cos.	Carterville
Domestic lump.....	\$2.50@3.00	\$2.75@3.25	\$3.00@3.50	\$3.00@3.50	\$3.25@4.00
Steam lump.....	2.50@2.75	2.50@2.75	2.50@3.00		
Egg.....	2.50@2.75	2.50@2.75	2.50@2.75	2.75@3.25	3.25@4.00
Nut.....	2.50@2.75	2.25@2.50	2.25@2.50		
Mine-run.....	2.25@2.50	2.25@2.50	2.50@3.00	2.75@3.00	3.50@3.75
Screenings.....	2.00@2.50	2.00@2.50	2.00@2.50		3.00@3.25
	Williamson & Franklin Cos.	Saline & Harrisburg	Poca. & W. Va. Smokeless	Penna. Smokeless	Eastern Kentucky
Lump.....	\$3.50@3.75	\$3.50@3.75	\$5.00	\$4.50@5.00	\$4.00@4.75
Egg.....	3.50@3.75	3.50@3.75	5.00	4.50@5.00	4.00@4.75
Nut.....	3.50@3.75	3.50@3.75			
No. 1 nut.....	3.50@3.75				
No. 2 nut.....	3.50@3.75				
No. 3 nut.....	2.75@3.25				
No. 1 washed.....	3.50@3.75				
No. 2 washed.....	3.50@3.75				
Mine-run.....	3.00@3.25	3.00@3.25	4.75@5.00	4.00@4.25	
Screenings.....	2.75@3.25	2.75@3.25			

Splint Lump \$4.25@4.50.

General Statistics

COAL MOVEMENT

Fuel shipments over 13 leading Eastern carriers for December and 12 months of 1915-16 were as follows, in short tons:

Classes and Railroads	December 1915	December 1916	12 Months 1915	12 Months 1916
Anthracite:				
Baltimore & Ohio.....	163,606	181,311	1,373,413	1,899,066
Buffalo, Rochester & Pittsburgh.....	16,195	18,936	156,032	166,754
Buffalo & Susquehanna.....	97	318	8,075	6,843
Chesapeake & Ohio.....	1,489	1,553	15,843	16,579
Erie.....	832,574	779,381	9,424,907	9,312,083
Huntingdon & Broad Top Mountain.....	99	57	650	900
Pennsylvania.....	1,079,076	962,106	10,953,209	11,996,964
Pittsburgh & Lake Erie.....	205	41	1,020	802
Pittsburgh, Shawmut & Northern.....	1,589	1,338	11,552	11,891
Virginian.....	434	419	2,269	3,693
Western Maryland.....	41,069	48,327	355,526	441,325
Total.....	2,137,306	1,993,787	22,302,496	23,856,905
Bituminous:				
Baltimore & Ohio.....	2,969,751	2,746,077	33,473,930	35,354,489
Buffalo, Rochester & Pittsburgh.....	910,426	814,605	7,953,439	9,450,671
Buffalo & Susquehanna.....	161,216	131,540	1,175,437	1,517,384
Chesapeake & Ohio.....	2,090,652	1,981,483	22,979,446	26,731,383
Erie.....	787,438	722,665	7,192,695	8,636,186
Huntingdon & Broad Top Mountain.....	129,679	120,427	1,089,821	1,205,077
New York Central (Buffalo and east).....	724,274	603,566	6,560,248	7,713,118
Norfolk & Western.....	2,208,506	2,190,395	26,698,726	30,749,390
Pennsylvania.....	4,298,382	3,828,420	44,514,366	48,167,136
Pittsburgh & Lake Erie.....	1,121,238	954,797	10,639,674	11,528,401
Pittsburgh, Shawmut & Northern.....	304,795	147,053	2,355,246	2,789,752
Virginian.....	301,901	438,205	3,890,050	5,509,155
Western Maryland.....	839,823	665,826	8,876,911	8,654,099
Total.....	16,848,081	15,345,059	177,399,999	198,006,241

NORFOLK & WESTERN

Destination of shipments over this road for January of last year and this year were as follows, in short tons:

Coal	1916	1917
Tidewater		
Foreign.....	186,495	200,482
Coastwise.....	353,960	240,286
Domestic.....	2,148,334	2,404,817
Coke		
Foreign.....	3,628	2,892
Domestic.....	152,720	203,983
Total.....	2,845,137	3,052,462

ANTHRACITE SHIPMENTS

The shipments of anthracite in February amounted to 5,178,432 tons, as compared with 5,940,725 tons in January of this year and with 5,696,306 tons in February, 1916. The decrease as compared with January was 762,291 tons, and as compared with February, 1916, the decrease was 517,874 tons, the latter being due principally to the shortage of labor this year as compared with last, though about 225,000 tons of it was due to the fact that in 1916 there were 25 working days and in 1917 there were only 24.

None of the carriers showed a record of a million tons for February, though the Reading came within 34,000 tons of that figure.

	February 1917	February 1916	2 Months 1917	2 Months 1916
P. & R. R. W.....	966,725	1,074,148	2,116,872	2,181,047
L. V. R. R.....	909,704	997,630	1,895,534	2,015,728
C. R. R. of N. J.....	536,023	597,694	1,154,211	1,221,554
D. L. & W. R. R.....	901,098	839,472	1,901,481	1,699,702
D. & H. Co.....	482,638	609,325	1,149,673	1,236,284
Penna. R. R.....	428,230	504,332	887,126	1,145,240
Erie R. R.....	637,325	699,700	1,320,372	1,366,694
N. Y. O. & W. R. W.....	143,711	185,896	308,386	360,916
L. & N. E. R. R.....	225,944	188,109	509,965	353,491
Total.....	5,231,398	5,696,306	11,243,620	11,580,656
* Deduction.....	52,966		124,463	
Total.....	5,178,432		11,119,157	

* Deduction: Tonnage reported by both C. R. R. of N. J. and L. & N. E. R. R.

I. C. C. Decisions

No. 8472—Big Muddy Coal and Iron Co. vs. Illinois Central R.R. Submitted Apr. 10, 1916. Decided Nov. 19, 1916.

Rates on bituminous coal in carloads from mines in the southern Illinois group to St.

Charles, Mo., found unduly prejudicial as compared with the rates on the same commodity from the Belleville, Ill., group to St. Charles, and a proper relationship of rates prescribed for the future.

No. 7769—Buffalo Union Furnace Co. vs. Buffalo & Susquehanna R.R. Submitted Dec. 10, 1915. Decided Feb. 5, 1917.

The adjustment of rates on coal and coke from points in the Reynoldsville district served by the Buffalo & Susquehanna Railroad Corporation to Buffalo, Lackawanna, and Harriet, N. Y., and other points in the so-called Buffalo-Black Rock switching district, found to be unduly prejudicial to the extent that the group rate on coal from the points of origin to the territory of destination named exceeds 80 per cent. of the rate contemporaneously maintained on coke from Tyler and Sykes, points on said railroad, to Lackawanna.

No. 9128—E. I. du Pont de Nemours Powder Co. vs. Pennsylvania R.R. Submitted Jan. 16, 1917. Decided Feb. 20, 1917.

The complaint alleges that the rate charged by the Pennsylvania Railroad Co. on certain shipments of coal ashes and cinder from a point on the Philadelphia & Reading Ry. in Coatesville, Penn., to Carney's Point, N. J., was unreasonable. The Philadelphia & Reading Railway Co. performed a service in connection with the shipments, but was not made a party defendant. Complaint dismissed.